80 U.S.

THE TRS·80 USERS JOURNAL.

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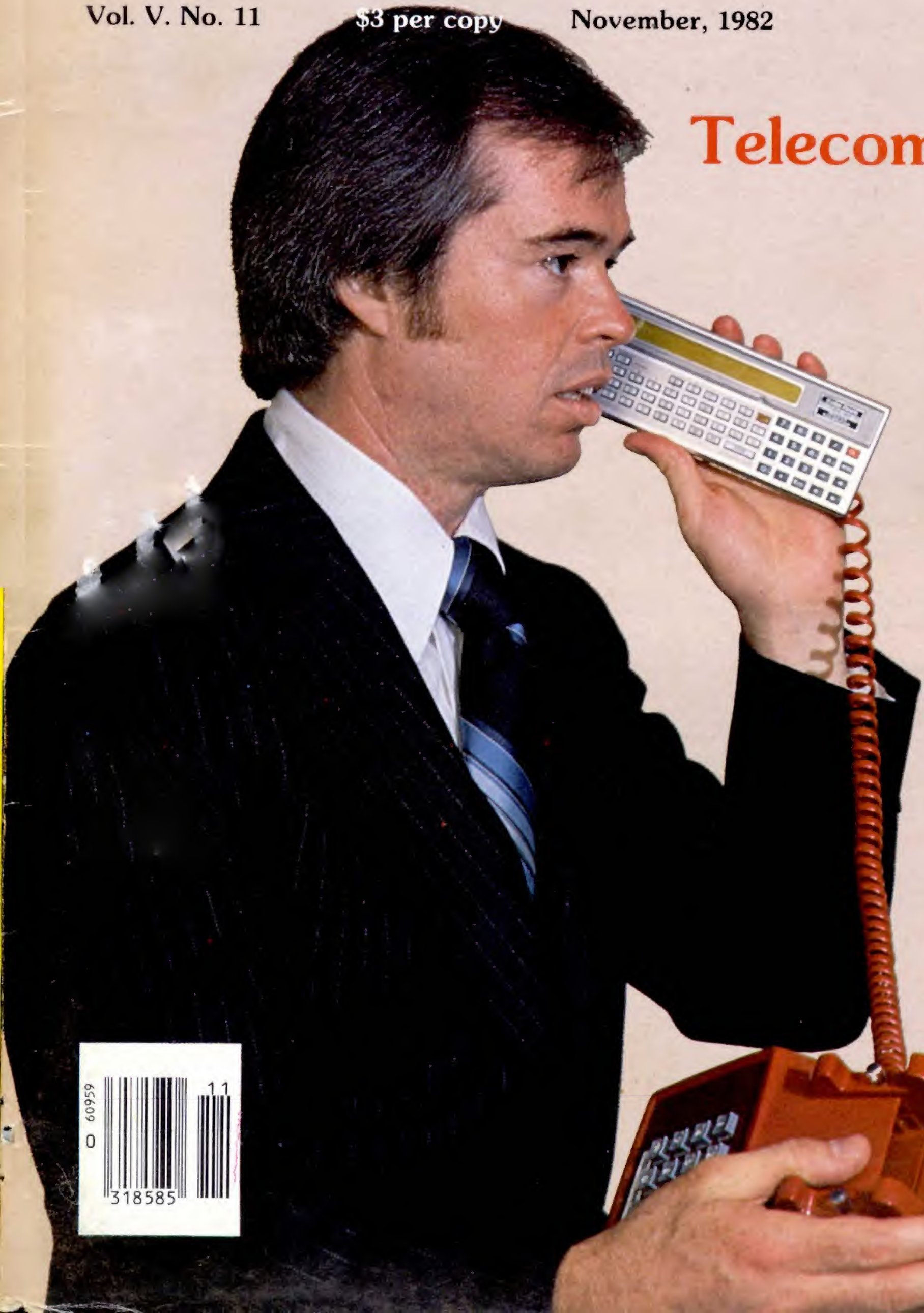

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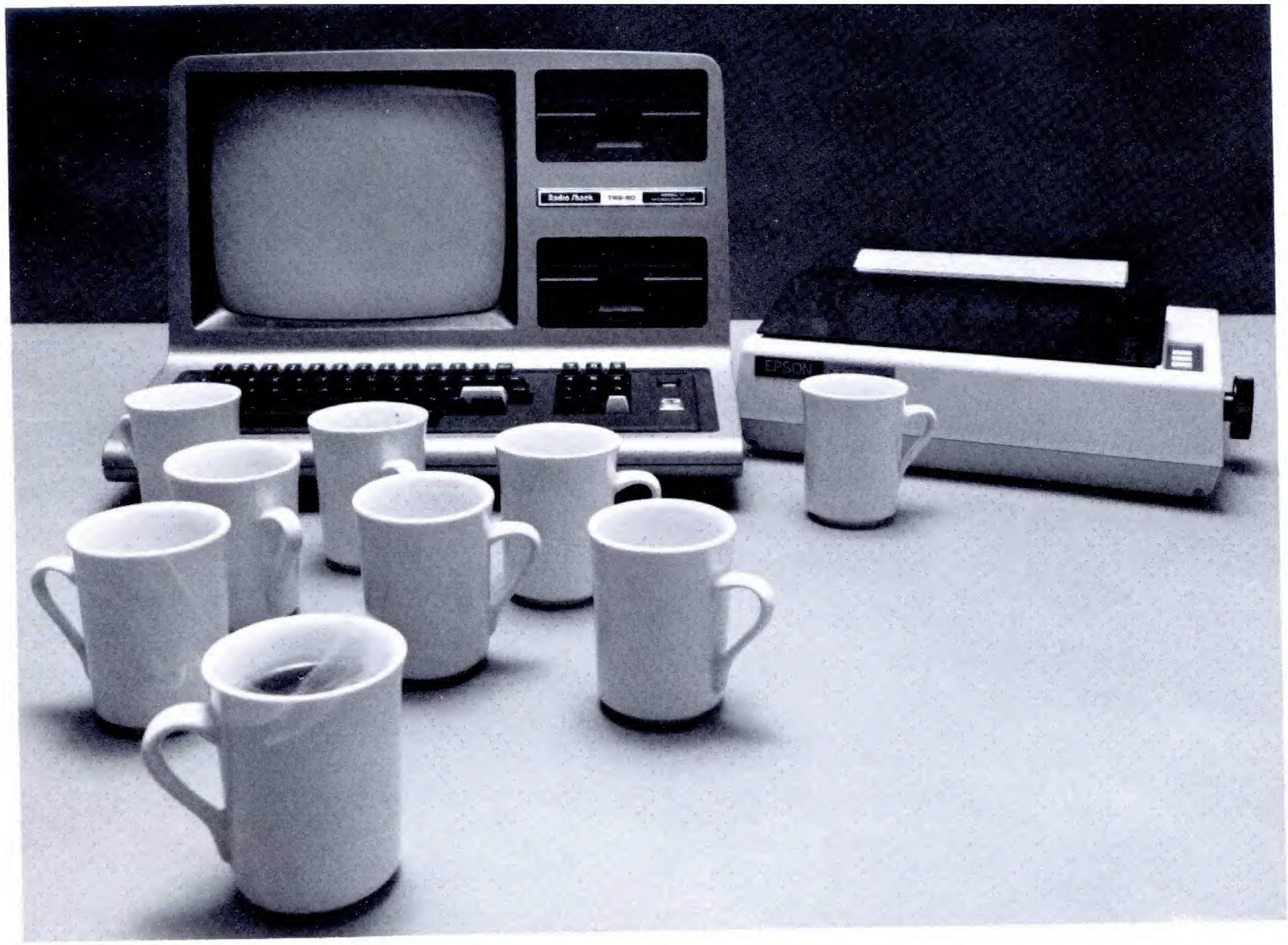

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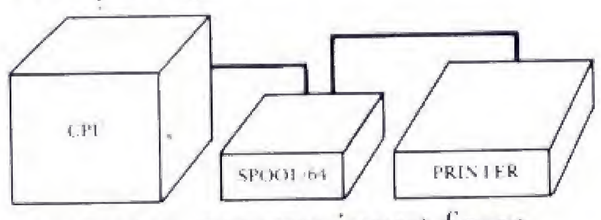

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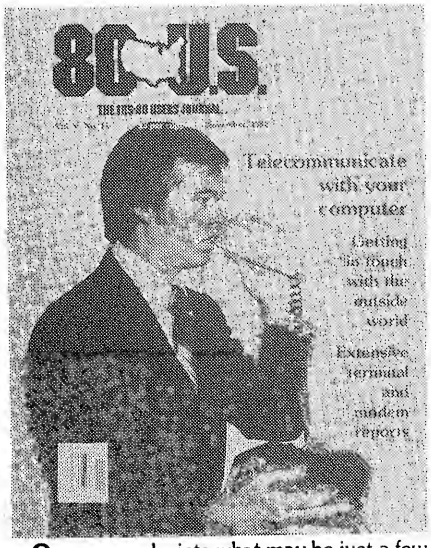

Our cover depicts what may be just a few months away—phones with built-in computers, or vice versa. The model is Dan Doyle of Seattle, WA and the photographer was Fred Johnsen, Tacoma, WA.

80-U.S.

THE TRS-80 USERS JOURNAL

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Editorial

By Cameron C. Brown

Com.mun.i.ca.tion: intercourse by speech, correspondence, messages, etc., information.

It's a nice word, but Webster has missed the point. Communication rests on people, and people trusting other people.

We have come a long way from the cave drawings and smoke signals of yesterday. A conveyor of information can choose TLX, 1200-baud modems, televised teleconferencing, satellite scramblers and a host of other methods to get his message across. The technology has made the world smaller, and turn a little faster, but what has really been gained?

If your words are couched in hidden meanings obfuscated in jargon, scattered in its organization and presentation, they are of less value than silence.

It has become clear that in too many cases the writer has not put himself in the reader's shoes. Before sending your next memo to the printer or Xerox, read it. A moment of your time can prevent hours of confusion.

The microcomputer revolution is an infant, yet it is already accused of some bad habits. Issue after issue of numerous magazines have been devoted to the dearth of documentation and its questionable quality. The difficulties we encountered in all of the manuals, pamphlets and directions while putting together this telecommunication issue were horrendous. To me it's just another glaring example of communication gone sour, the reader's shoes were never tried.

Almost every computer has some type of word processor running on his machine. It's too bad there isn't an idea filter to go along with it. I don't believe that easy editing, formatting and copying is the key to our problem. If anything, it has become too easy to send out silly messages and memos.

Once upon a time, there was a bookstore with a computerized communication network and priority response memos. The in-store promotion cards that hung from the ceiling were called danglers. It so happened that one day a shipment of danglers went out from the home office, with one store receiving two sets. The very next day, every store manager in the country had a priority, must-respond memo that one outlet was danglerless. It's nice to know that the computer has helped us progress so far. I am sure happy that no one is going danglerless in Texas.

Everyone has their own story about computerized mail, from letters addressed to dear Mr. *80-U.S. Journal* to the funeral home flyer sent to occupant (I sent that one back marked deceased). Mine goes like this: Recently there was a death in our family. We notified numerous credit companies to cancel the account and forward a final statement. One oil company responded very quickly and their letter went on to say "... thank you for your patronage in the past and we look forward to serving you in the future." Perhaps they know something we don't.

Now back to that idea of trust. Communication is two-way; the recipient must be open and receptive to your message. The sender needs to be forthright and clear. Once these two conditions are present, ideas can flow like water. Communication is people talking to people. Anything less is noise. ■

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Letters

The article by Robert L. Green in your May issue saved me considerable time and money. I found my newly-purchased Epson printer wouldn't work with my Model I even though my Centronics-type printer (R. S. Quick-printer) worked fine. Mr. Green's easy-to-follow instructions solved the problem quickly, so I didn't have to buy a special Epson cable or an expansion interface.

My printer, by the way, is Epson's new MX-80 F/T with Graftrax-Plus, not the older model described in the article. It has so far been a joy to use.

My sincere thanks to you and to Mr. Green.

John H. Heidema
Jacksonville, IL

You are welcome. —Ed.

I enjoy your publication, especially the reviews. The programs you publish appear enticing, but past experiences have let me know that I am not a typist.

I enjoy using my Model III, but don't want to spend hours typing in a program and even more hours trying to correct the typing errors.

I sincerely wish your magazine would provide the programs on cassette or disk like the ones available from *CLOAD* or *LOAD-80*. I subscribe to both of those tapes and I would be the first one to sign up for your tapes.

Your programs are great, but we non-typists need help. Your views of any prospects would be appreciated.

William E. Baker
Independence, MO

We are actively investigating methods whereby you could obtain software without typing. Stay tuned for more news later. —Ed.

Suggestion for *80-U.S. Journal*: You have listings of assembly language programs (such as on page 59 of the August 82 issue), but how are they entered into the computer?

Line 00020 appears to be 62 spaces long so it would appear one just enters it "as is" but line 00120 has the code to the left which would make the line too long for a 64-character screen.

It may sound like I have not tried to enter any code and I have not for I want to be sure it will work before investing the time to enter it. Time is too short to allow me to play with it and possibly stumble over how to do it.

Possibly this would make a short article and could be subject of a periodic Refresher Box for those that came in late.

J. C. Halbrooks
Sterling, CT

WHOOPS! You are absolutely correct! The program is an assembly language listing. What we have unjustly assumed is that everyone knows how to enter them into their computers. Apparently there are many of you who have recently entered the microcomputer world and simply aren't yet familiar with all its capabilities and associated needs. To help clarify the problem, read on.

In order to enter any assembly language listing you will need an Editor/Assembler. There are many good ones currently available, but unfortunately, they are not necessarily compatible with each other. That is, an assembly language listing in a magazine may not work if you are not using an Editor/Assembler which is compatible with the one that generated the program in the first place. The major precaution you must take is to screen an article closely and determine which Editor/Assembler was used to generate the program. Every attempt is made to provide our readers with this information so they will know beforehand whether or not a program will work with their software and hardware. Assembly language is a whole 'nother world so, if you are determined to learn something about it, check with your nearest Radio Shack dealer. They have several good books available which will be of great assistance in this area. —Ed.

I read with interest your editorial in the August 82 issue. In the main I would have to say that your negative points (regarding micros in the classroom), though numerous, are well taken. But then wasn't it Lincoln who remarked that we are more likely to unite on our similarities than we are on our differences? The real question is "Are we satisfied with the fifty percent output that any singular educational design almost guarantees?"

If a fifty percent "people scrap rate" gets you excited as a conscientious citizen then perhaps the creative alternatives to your cited negatives might be explored and micros could be applied to helping determine how each student makes meaning out of their environment. Then based upon the resultant data-set (there are at least 1920 different ways) a prescription of involvement in six or seven different delivery methods might be structured for each student. Perhaps with a lot of work and micro assistance a ninety-ninety output could be realized for our young citizens (ninety percent of an open enrollment achieving ninety percent of the staffed course goals).

Accountability for learning outcomes is something that will be with us until it can be said "Every Kid a Winner."

I think it's an exciting time to be alive and realize that with all of the micro negatives there is yet so much inherent flexibility that everyone can find a successful role in bringing into fruition the ninety-ninety goal.

Thank you for your kind attention.

Lon Griner
Huntsville, AL

Thank you for the comments but my reservations still hold. I believe that the ninety-ninety goal will be met when we stop kidding ourselves and fully fund education as it should be. Computers are cheap but they will never replace the one-to-one relationship that can be developed between teachers and students. Filling rooms

with thirty terminals, forty kids and one teacher is no solution, no matter how good the software is. You are right, it is an exciting time. —Ed.

Dettmann, Dettmann!

Basically BASIC, August 1982.

```
510 C$ = INKEY$: IF C$ ="" THEN 510

2410 C$ = INKEY$: IF C$ = "" THEN 2410
```

You have just called the garbage collector, twice! In the time it takes to shuffle papers and get ready to type, the INKEY$ function has filled memory with C$s.

I believe (for the Model II) the code should be:

```
510 IF INKEY$ = "" THEN 510
```

This line of code is contained in the interpreter, and memory is not disturbed by any assign statements at all.

Please keep up the good, clear, business-like articles. Someday, somebody may even write to say thank you, thank you, **thank you!**

F. L. Eskholm
Nutley, NJ

Thank you for the nice comments. Please notice that in my article I was using C$ to build up IN$. With your suggestion, the garbage collector is not called, yet there is no record kept of exactly which key was pressed. — T.R. Dettmann

---

In your May/June 1981 issue, T.R. Dettmann warned of a "basic incompatibility" between the Model I and CP/M due to the tendency of CP/M programs to "expect to find important references" where the BASIC Interpreter is located. Lately I've been seeing advertisements for CP/M adaptations for both the Model I and the Model III. For example, there are Freedom Technology International's "Freedom Option" and "Freedom Plus," and Omikron's "Mapper I," etc. Both of these advertisers promise access to "standard" CP/M software upon installation of their modifications. Has the situation changed that radically? Perhaps we should have another evaluation.

And please allow me to second Daniel Armstrong's motion that Exatron pay more attention to the education of ESF owners who are not assembly language programmers and who do not have previous experience with disk systems. After all, the ESF is supposed to be an alternative to the disk drive, not a supplement. There's a real danger that interest in the ESF will erode as novice customers reach the limits of commercial ESF software.

By the way, is any one selling an ESF communications program for the RS-232?

Chris Jensen
West Point, NY

If enough readers request it, we will go after more CP/M reviews. —Ed.

I've been a faithful reader for over a year and I really get a lot from your fine *Journal.* Going monthly was a great improvement since it gave us much more information and in a good format. Keep up the good work.

I've always wanted a renumbering program for my Model III (cassette only), but Radio Shack, in their great wisdom, decided it was not worth the effort to change their 26-2004 for use with the Model III. In the Sept. '82 issue of your *Journal* we find that Jerry O'Dell of Ypsilanti, MI found that it was rather easy to make the change and wrote an article to the effect. I've done the changes indicated and it works perfectly. I made the changes using DEBUG, rewrote it for the top of the 48K that I have, and then produced a new system tape for my use. Thanks a bunch, Jerry.

Incidentally, all you Model III cassette users should have 48K memory since it is so easy and cheap to install yourself. The sockets are there just waiting for the 16 chips to be plugged in. (Use 200 nanosecond chips or faster.) I've seen them advertised for less than $15 for eight. Thirty dollars brings you 48K and the joy of plenty of memory for Scripsit, a place to tuck all of your utility programs up and out of the way, etc.

As one learns more about one's computer it pays to go back and reread past issues of magazines and pick up on the things you skipped because you didn't understand them. The learning curve then becomes almost exponential.

Bill Pottberg
Burlingame, CA

Thank you. We are pleased to have been of help. —Ed.

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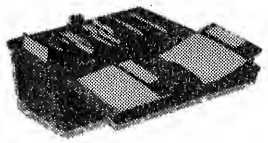

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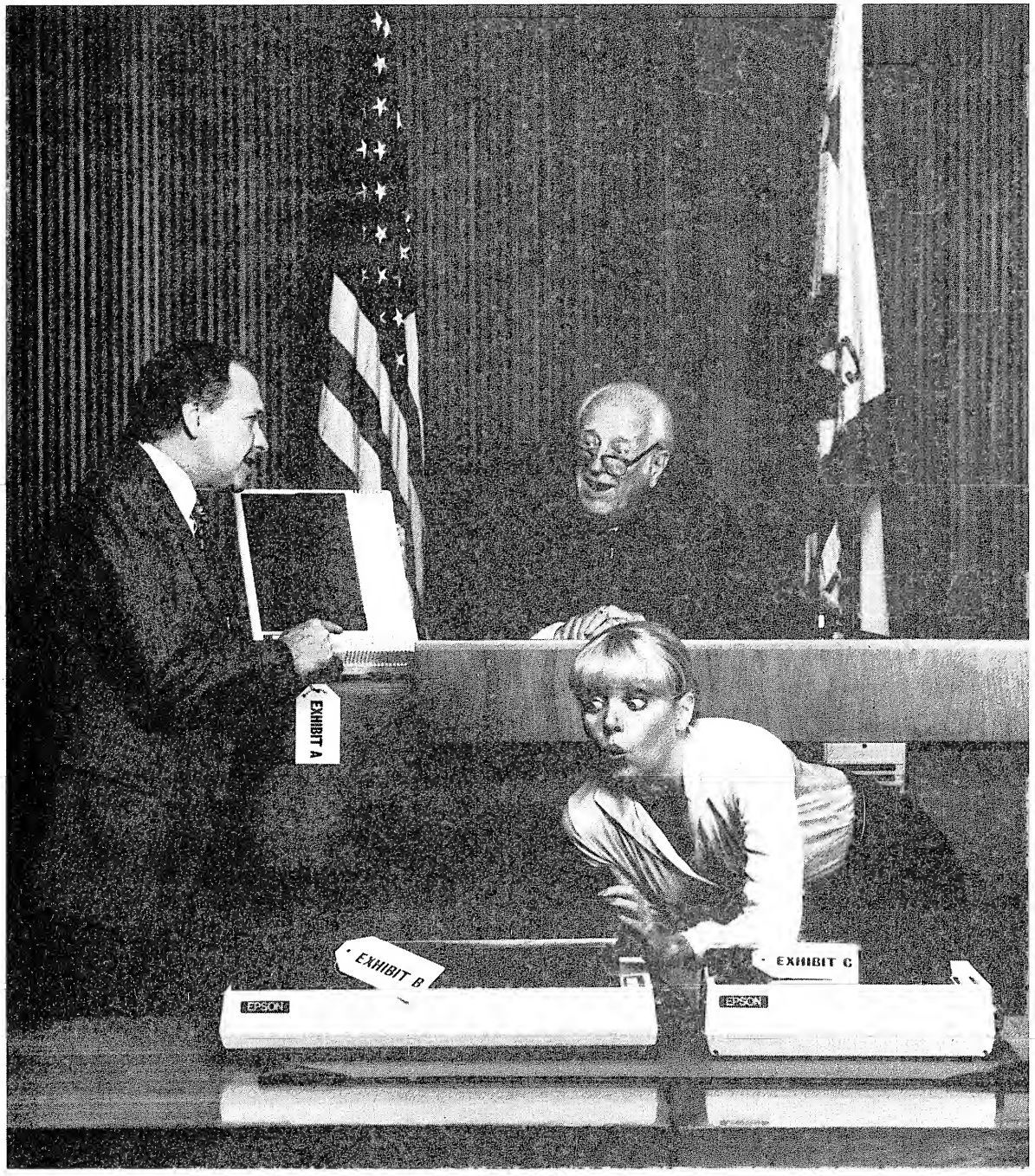

The facts.
And nothing but the facts.

Epson.

Our MX Series printers are the best-selling dot matrix printers in the entire world. This is why.

Fact One: We've got your type.
Epson invented correspondence quality printing. And we still do it better than anybody.

But more importantly, we do *more* of it than anybody. On every Epson MX printer, you get a choice of *sixty-six* different type styles, including italics, a handy subscript and superscript for scientific notation and small print, enough international symbols to print most Western languages, and one-pass underscore. All in a tack-sharp, easy-to-read 9x9 matrix with full descenders.

If print quality is important to you, your next printer is an Epson.

Fact Two: Ultra-high resolution graphics.
There simply is no higher resolution graphics than GRAFTRAX-PLUS. And it comes standard on every MX.

You get bit image graphics free of wander, walk and jitter; graphics with blacker blacks and better definition because you can precisely place a dot at any of 25,920 positions inside a square inch (that's 120 DPI h x 216 DPI v); graphics that make our printers rival plotters.

If graphics is what you want, your next printer is an Epson.

Fact Three: Feature shock.
The Epson MX Series is packed with the features printer fanatics want most. A bidirectional print head with logical seeking of the shortest line. Programmable tab, form length and right margin. Top of forms recognition. Skip over perf. Software printer reset. True backspace. Self test. The world's only disposable print head. And more. Lots more. On our MX-100 and MX-80 F/T, you even get both friction *and* tractor paper feed.

If you want performance, your next printer is an Epson.

Fact Four: Incredible reliability.
Epson MX Series printers are the most reliable printers ever made. And the reason is precision.

Take a look inside one and you'll understand. Notice the simplicity, the fit, the finish. That's why Epson has an out-of-box reliability rate others can only envy: 98%. And why our mean cycles between failures (MCBF) is over five million lines.

The whole package is neatly wrapped in a rugged plastic injection-molded case designed to look good — and stay looking good.

If you want a printer that works, and keeps on working, your next printer is an Epson.

Fact Five: World's best seller. Period.
Within months after we introduced the Epson MX-80, it was the best selling dot matrix printer in the world. It still is. Not because of anything *we* said, but because tens of thousands of computer enthusiasts went out and did some serious comparison shopping. *They* decided it was the best printer for the money they could buy. And who are we to argue?

If you want the world's best seller, your next printer is an Epson.

Fact Six: Quality doesn't cost more.
Don't take our word for it. Check it out. Look at what they give you. Then look at what we give you. Then look at the price.

There is only one logical choice. Epson.

And that's the truth.

"In my judgment, this is the best printer you can buy."

Your next printer.

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Items at random

We are getting reports that some copies of our September issue were sent with pages missing and pages duplicated. It turns out that the bindery has a thickness sensor which dumps copies that are too thick or thin. But, what can it do when a group of pages are left out and the exact number of pages are put in as duplicates? Nothing. Our apologies to those who received those issues. Please let us know (at our Tacoma address) and we will send you a replacement copy.

In past issues of *80-U.S. Journal*, you may have noted the fancy cartooning. This is the work of Don Snowden from Gig Harbor, Washington. Don draws a weekly editorial cartoon for the *Peninsula Gateway*, a local newspaper. He has recently been honored for his work by the National Newspaper Association in its annual National Better Newspaper Contest. His entries won an honorable mention award in a field of more than 3600 entries. We are pleased to have Don working with us. I still chuckle at the sight of Captain 80 at the arcades in our September issue!

I am constantly amazed at how little use is made of our free Bulletin Board service (usually found on the last page, near the advertiser index). Do you have a one-of-a-kind item for sale, or do you want to acquire such an item? Do you want to advise others of your group meetings? Well, it's there for you to use — free — go for it!

Life at 300-baud, or How Our Thanksgiving Turkey Turned to Crow

Is life at 300-baud as exciting as it's cracked up to be? In the preparation of this issue, we did a lot of connecting and reconnecting. We logged-on many communication services and bulletin boards, using a variety of equipment. It was both fun and frustrating.

It turns out that telecommunication seemed to be the answer to one of my own problems: How to access a Model 16 at the office from my home. Wow! The best of both worlds — effectively, *two* computers, and one of them costs just $700! With this setup, I could write scathing editorials at 2:00 a.m. if I wanted, or write that super program on a rainy Sunday afternoon with my faithful dog (Killer) laying at my feet and my sweet wife bringing me fresh coffee. What a wonderful, but disillusioned, dream!

My first step along this rueful path was to the Computer Center to buy a DT-1 terminal. Naturally, it came without modem or printer cable, so those were purchased separately. Then it was off to the office to try it between two different rooms to check it out.

The first minor annoyance was that the DT-1 would not sit straight on the desk. It had a terrible list to port (left, viewed from the front). It turns out that the cable specified for the terminal has a hood over the connector which extends straight down about an inch farther than the feet of the case. Undaunted, we piled books under each side to build it up. Which books? Why, the instruction manual for the DT-1, of course.

With that out of the way, we attempted to hook up the printer with the cable, but it didn't fit. The cable was a Model III printer cable (isn't the DT-1 really just another Model III)? No, this was a totally new plug, one not seen on any of the TRS line. Oh, well, we can live without a printer for a while.

Being careful to go just one step at a time, we then connected to the phone line and called a bulletin board. It worked! Okay, now let's try a direct connect cable to the Model 16. With the Model 16 in Host mode, it worked perfectly.

The big moment hadn't really come yet. We still had to connect the Model 16 to a direct connect, auto-answer modem, and try it from another telephone.

Our telephones at the office are supplied by Ma Bell, and the system we use is called the 416 system. That means four lines and up to sixteen instruments (excuse me, Ernestine). We connected with an auto-answer modem which had been checked out elsewhere and the Model 16 went crazy trying to find nonexistent programs on diskette. The modem was in send and receive at the same time!

I don't think the ring-a-ding company really wants to talk to us about it. After all, we are hanging *foreign* things on their lines.

I now have the equipment in my office. I have a choice of typing directly on the Model 16 keyboard or moving over two feet and typing on a DT-1 keyboard. Besides that, being direct connected, we can baud along at 9600. Alright! It isn't working, but look at what we learned along the way.

In This Issue

In spite of the foregoing, we have put together this issue on communications.

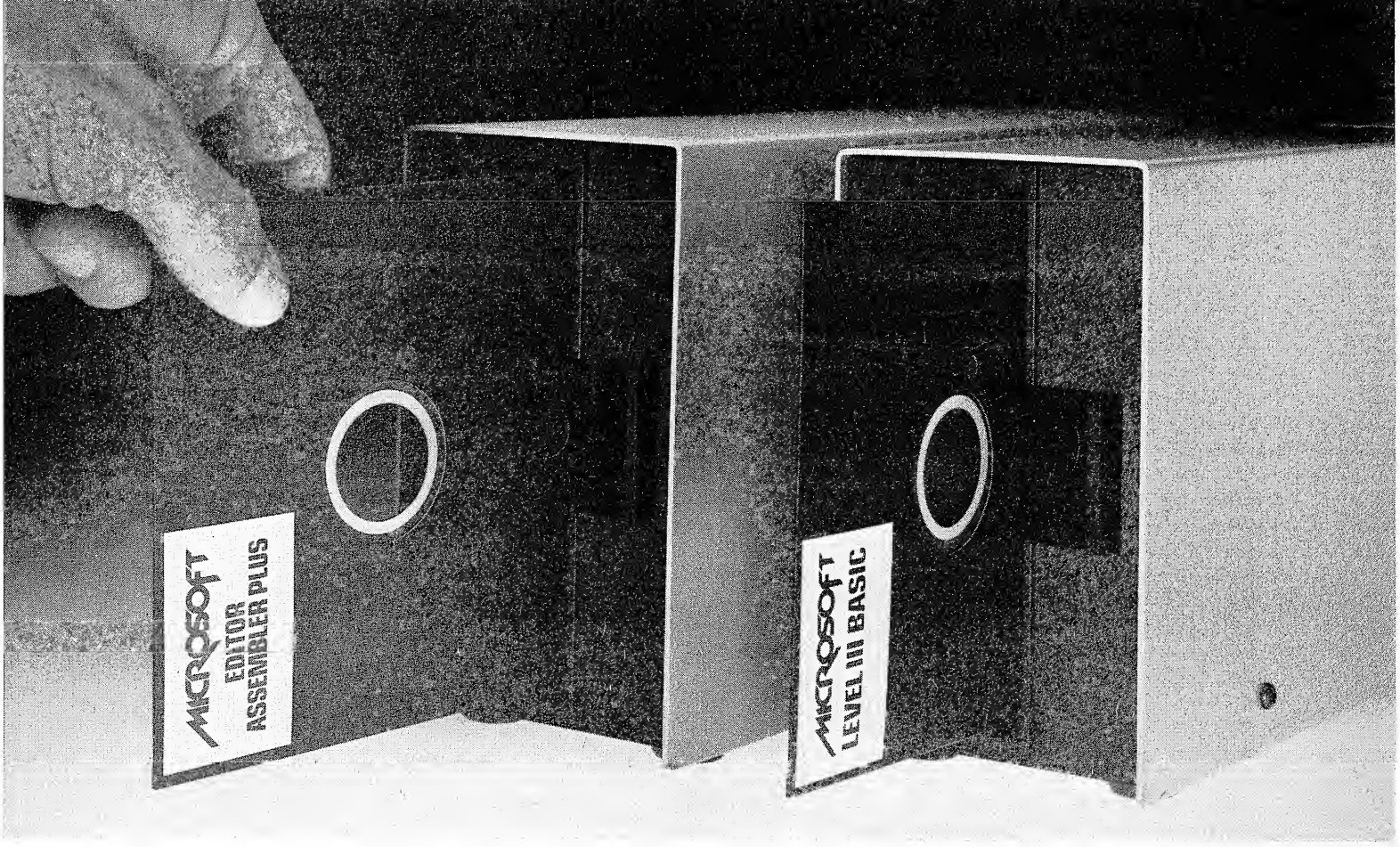
Don Stoner, a man who probably forgot more about communications than we will ever know, gives an overview of what is possible. He is also the man behind BankBox, mentioned on page 19.

Further on, Al Mashburn gives an introduction to the CompuServe Information Service. It is a "here is how it worked for me" article that you should find interesting.

Jim Klaproth and Don Scarberry really put in a lot of effort and came up with a shopper's guide to terminal packages and modems. It starts on page 24, and I'll bet you find the tables as useful and interesting as we did.

For Color Computerists, there is an evaluation of the COLOR-COM/E, by Darrell Wright, and a useful program to produce a list of variables used in color programs by Joseph P. Laronda.

Our regular columns are all in. There are more great articles and plenty of reviews to keep you through the Thanksgiving holidays. Until next month, make a nice holiday for yourselves. **Mike**



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- MENU. One command that allows you to construct an entire menu.
- CHAIN and COMMON commands allow you to call another program and pass variables to it.
- Powerful editing commands such as COPY/TRANSFER, FIND and CHANGE.
- DUMP command that makes debugging easier.
- Time-limit response. New INPUT # LEN and LINE INPUT # LEN commands allow you to set a time limit on response.
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- More. Level III gives you automatic line numbering, 26 user-definable single stroke instructions, and more.

Disk or cassette. Disk versions of Level III and Editor/Assembler-Plus are brand new. Cassette versions are also available with many of the same capabilities.

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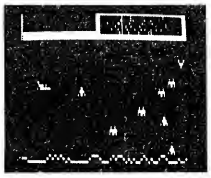
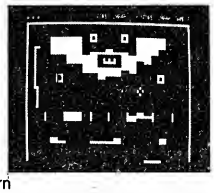


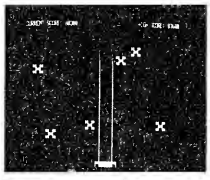
DEMISE

By Case from Acorn
A fast-action space game that's ***very*** challenging! You must destroy the aliens with lasers and "smart bombs." Then, make your way carefully through a meteor storm and a rocky tunnel. Great sound effects; keyboard control.
16K Tape or Disk, $19.95



KING OF THE JUNGLE

By Vandewalle from Acorn
An unusual combination of fast pinball action plus the challenges and dangers of an arcade game. Keep the ball in play, scoring points as it caroms from obstacle to obstacle, while wandering through the jungle searching for the hidden crown. And try to avoid the deadly Cobra. Lots of action, sound and fun! Choice of 3 screens. Can be used with Trisstick joystick.
16K Tape or Disk, $19.95



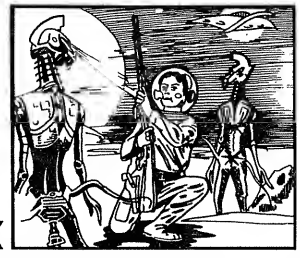
EVADE

By Knight from Acorn
You're in charge of the USS Krestan, an interstellar tri-ship. If you defeat the enemy aliens you encounter, you get a chance to earn extra points by successfully docking with a larger ship. ***Then*** come the evil Malicians and dangerous meteor showers. Never a dull moment with this one!
16K Tape or Disk, $19.95

MYSTERIOUS ADVENTURE

ARROW OF DEATH, PART 1

By Brian Howarth from Acorn
Proper English only! This British import is Acorn Software's first adventure and it meets their reputation for high quality. The vocabulary you use in this adventure must conform to proper English standards—not the barbaric tongue spoken here in the colonies! You and Sorcerer Zardra must restore the kingdom from the engulfing sense of bitterness and ill feeling that forced the ruler to flee the palace.
16K Tape or 32K Disk, $19.95
Hint Sheet, $1.00

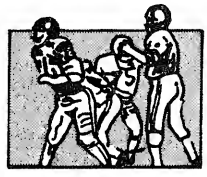


PANIK

By Demas from Fantastic
An arcade style game of a fascinating future world with high-res graphics and **voice**. Filled with action and excitement; in machine language.
16K Tape, $19.95 **32K Disk, $24.95**

ARMORED PATROL

By Westmoreland & Gilman from Adventure
As commander of a lumbering T-36 tank you have the firepower to destroy the enemy—if you can find them. They may be hiding behind the houses scattered about, the bleak terrain and your only view is thru the drivers port (your screen). Impressive animation in this arcade game.
16K Tape, $19.95 **32K Disk, $24.95**



COMPUTER FOOTBALL STRATEGY

From Avalon Hill
Exciting computer version of the famous board game. You'll have to think fast as you plan the offensive and defensive formations for your team. Play against the computer or a friend.
32K Tape, $21.00

ASYLUM

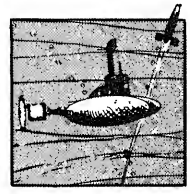
From Med Systems **
You are sitting alone at 2 AM. Your eyes are bloodshot as you peer into your computer's screen and cry, "I must be CRAZY!" If this has never happened to you, you've never tried ASYLUM. It's Med Systems most ambitious 3-D graphics adventure yet!
ASYLUM places you on a cot in a small (padded?) room. Periodically the janitor lobs a hand grenade through the window. What you do next could mean escape—or disaster.
16K Tape, $19.95 **32K Disk, $22.95**
Also available:
ASYLUM II
16K Tape, $19.95 **32K Disk, $22.95**

STRIKE FORCE

From Melbourne House
You are the warrior-savior of cities under relentless allen attack. You're armed with rapid-fire missiles, radar and incendiary star-shells; but you'll need your fastest thinking and instantaneous response to protect yourself and your people. Great real-time graphics!
16K Tape, $15.95 **32K Disk, $19.95**

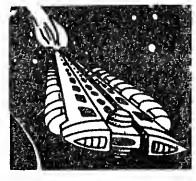
PENETRATOR

By Philip Mitchell from Beam
Armed with missiles and bombs, you must fly your fighter to the enemy's cache of neutron bombs and destroy them. Your mission is in four stages, involving rugged terrain, caverns and manmade obstacles—not to mention enemy radar, missiles and paratroopers. This new departure in arcade gaming allows you to set up your own terrain and enemy emplacements, then save them for future use. Make your mission as hard or easy as you like. Joystick compatible.
16K Tape or 32K Disk, $24.95



SEA DRAGON

By Westmoreland & Gilman from Adventure
Underwater adventure is yours as you command a nuclear sub armed with deadly missiles and torpedoes. Guide it carefully through sea mines and underwater mountains; watch out for depth charges being fired by overhead ships. . . and don't run out of air! Scrolling sea bottom for added excitement.
16K Tape, $19.95
32K Disk, $24.95



REAR GUARD

By Neil Larimer from Adventure Int.
A space battle between your cruiser and wave-after-wave of enemy ships. You can destroy them with your energy darts or you can ram them—as long as your shields are intact. The action takes place on a continuous horizontal landscape. You control the altitude and speed of your craft as you pursue the enemy. Skill level 1 is exciting, and there are four more levels available.
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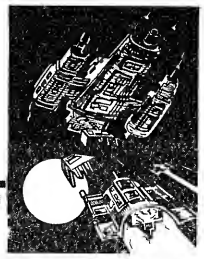
CATERPILLAR

From Soft Sector Marketing
This is the fast-action arcade game you've been waiting to play at home! You must hit mushrooms and caterpillars—segment by segment—moths and tumble bugs. The challenges: they are all moving; when hit they split into additional segments or metamorphose into different shapes; when you destroy a caterpillar, the new one that replaces it is a segment ***longer*** than the original!

16K Tape, $15.95
32K Disk, $19.95

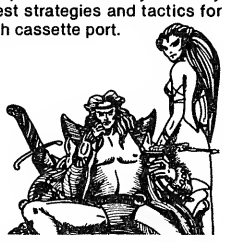
HYPERLIGHT PATROL



By Warren Green from Fantastic
Realistic space conflict simulation with continuous projection map display that shows you **complete globe** of space around your airship: front, sides, back, above and below. Your ship—and the enemy's—can maneuver in 3-D space, and can move by hyperlight jumps. You can only learn by playing what are the best strategies and tactics for survival. "Talks" through cassette port.

48K Disk, $19.95

THE WYLDE Warriors of RAS, Vol. 3



By Masteller from Med Systems
The newest in this fascinating series of adventure/role playing games. You ***create*** the characters, then play the game, solving all its complex challenges. Save the games, and the characters. Characters are interchangeable among the 3 volumes. Machine language, great graphics. No "rules" to consult; no waiting for the computer.

48K Tape or Disk, $29.95

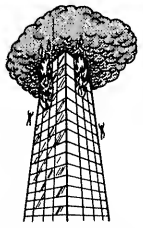
Also available:
KAIV, Volume 2, 48K Tape or Disk, $29.95

BOUNCEOIDS

From Cornsoft
We're not sure what they are, but they're **huge** and dangerous! BOUNCEOIDS bounce off walls, and can kill with one touch. Your mission is to destroy them with your new class 4 annihilator. Then there are the terrible bugs coming out of null space to crunch you to smithereens. You'll need coordination, strategy and courage! Joystick-compatible.

16K Tape, $15.95 **16K Disk, $19.95**

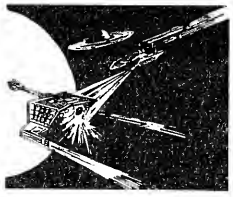
SKYSCRAPER



By Fine from Superior
3-part maze game for the nimble-fingered. First, you must move through maze while avoiding barrels coming at you; second, you must look out for fires that break out randomly on screen; third, you ride elevators up and down from platform to platform. The sky's the limit...how far can **you** go? 1 or 2 player game with sound; joystick compatible.

32K Tape, $19.95 **32K Disk, $21.95**

DEFIANCE



From Fantastic
The first talking space simulation! You're defending Starbase 12 during war between United Federation of Planets and the Klingon Empire. You have just been given command of the USS Defiance, and are authorized to take any action necessary to defend yourself and the Federation. "Talks" through cassette port; joystick compatible.

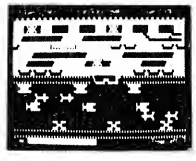
48K Disk, $24.95

DUNZHIN Warriors of RAS, Vol. 1

By Masteller from Med Systems
The first adventure/role playing game to combine fast graphics, fast response time and complete computer implementation. DUNZHIN places you in a many-level dungeon, filled with demons and goblins. You must search for hidden treasures, but only **one** will win the game. In this series you create the characters, and can save them for future games, or use them in other volumes.

48K Tape or Disk, $29.95

LEAPER



From Cedar Software
Fast action, machine language game for one or 2 players. Your frog must dodge traffic and cross river on fast-moving logs. Ready, set... ***LEAP!***

16K Tape, $15.95

INSTANT SEARCH/ SORT DATABASE

By G. Hatton from Acorn
An easy-to-use, yet powerful database management tool, ISS alleviates many of the complications usually found in setting up and maintaining information files. Written in machine language, ISS can provide a multitude of sorts, subsorts, searches and categorizations in seconds. Because the processing is done in memory, you can manipulate the data at will without risk to your database on tape or disk. The number of records is limited only by your file format and the amount of RAM in your system.

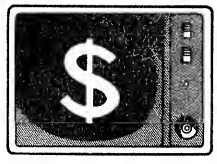
16K Tape or 32K Disk, $49.95

SUPERSCRIPT

By Richard Wilkes from Acorn
Using your SuperScript modified Scripsit Word Processor and a compatible printer, you can now underline, boldface, insert text during printout, slash zeros, set type pitch, subscript and, of course, superscript! You can even read your directory and kill files without ever leaving Scripsit.
SuperScript comes with drivers for popular serial and parallel printers (now including Centronics 737 and RS Daisy II), and easy instructions for patching to your Scripsit program (does not include Scripsit).

32K Disk, $49.95 Use Model I Scripsit

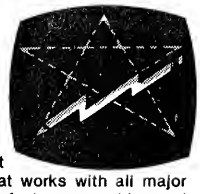
MONEY MANAGER



By Andrew P. Bartorillo from Acorn
A complete management tool for the home budget, it keeps track of your checkbook and provides for easy budget allocation. You can store information on up to 100 checkbook entries per month (250 with 48K), specify automatic withdrawals, keep records of tax deductibles, record expenses by category, even break up charge account payments into the proper categories.

32K Disk, $39.95

POWER DRAW



By Kim Watt from Powersoft
A graphic screen editor that works with all major operating systems. Special features: graphics and text may be intermixed; screen may be saved to available memory buffers; buffers may be saved to tape or disk in 6 formats; single and double wide video are supported. With trace mode to constantly display cursor positioning; grid mode to aid in centering figures on screen. Alpha joystick compatible.

Disk, $39.95

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Notes

You may have noticed that the model headings on our articles have been slightly altered. We all know that the TRS-80 is a fine machine, so good in fact that other manufacturers have produced computers which are TRS-80 work alikes.

According to Mr. George Wussow at PMC Software, the PMC-80 will run all of our Model I programs. The video maps, memory layout and ROM calls on the PMC-80 are a perfect match. There are only a couple of instances where the PMC-80 will not function as a TRS-80. Some software is now sold in a Model I/III version, where the program checks the ROM for the RS Level II logo. Obviously on the PMC-80 the software won't find it. Users of DOSPLUS 3.3 or 3.4 will find that the PMC-80 defaults to uppercase, but a patch is available from PMC.

Mr. Ken Woog of LNW Research Corporation has the same good news for users of the LNW80 Model I. As a matter of fact, by using LNW BASIC, even the Color Computer programs will run, although there are some very minor syntax changes needed in using some commands. Owners of the LNW80 with the Extended Disk BASIC can configure their machine to operate just like either a TRSDOS, NEWDOS/80 or DOSPLUS 3.4 system.

We hope that the owners of these machines find *80-U.S. Journal* to be as fun for them as it is for us.

Puzzler

Write a BASIC program that will deal out a standard bridge deck of 52 cards for four players. We are looking for speed and efficiency in this one. Send a printed listing to *Puzzler*, c/o *80-U.S. Journal*, 3838 South Warner St., Tacoma, WA 98409. Winning submissions will receive notoriety, a free tour of *80-U.S. Journal* facilities (you pay transportation), and our thanks. Good luck.

Color Computer Users

When using the PRINT@ command on the Model I or III, you can print characters on the screen, in any position, in any order. Not so on the Color Computer.

For example, the listing below will print the letter H at location 30 on the first line of the video, and then the letter L on the same line but in a position that precedes the H.

```
10 CLS

20 PRINT @ 30, "H"

30 PRINT @ 20, "L";

40 END
```

Pay special attention to the fact that the letter H is printed before the letter L is printed.

If you run the program on the Color Computer, the letter H will be erased, even though there is a semicolon used in line 30 to prevent the cursor from moving to the end of the video line. Be sure when attempting to PRINT@ on the Color Computer you have the sequence of instructions correct, otherwise the output will not be what you had planned.

Model III Disk Users

Mr. Jay Schultz of ICM Industries, Carmel, IN, has sent in an easy patch for those of you who are tired of getting only numbered error messages from TRSDOS. With this patch, TRSDOS will proceed to display the full error message whenever an error is encountered. No need anymore to get out a reference sheet or ask TRSDOS what it is talking about. Under TRSDOS, simply type:

```
PATCH *4 (ADD=4E28, FIND=20,
CHG=18)
```

Thank you Mr. Schultz, that was easy.

Model III Users of Solitare — June 1982

Mr. Jim Daly of Norcross, GA has forwarded some simple additions to the Solitare game which we published earlier this year. By adding his lines of code, the program will take advantage of the Model III graphics characters and display the suit symbols beside the cards in the tableau. The addition will not affect the play of the game, it only makes for a more attractive screen layout. Insert PRINT CHR$(21): at the start of line 190 and then add the following lines:

```
205 CS=192
210 FOR J=1 TO 4
215 FOR I=1 TO 13
220 READ CV$
225 A$((J-1)*13+I) = CV$ +
CHR$(CS)
230 NEXT I
235 RESTORE
240 CS=CS+1
245 NEXT J
250 DATA A,2,3,4,5,6,7,8,9,10,J,Q,K
```

Thank you Mr. Daly, it makes me wish the symbols were on my Model I.

Lastly, a slight correction to a note we published in September 1982. It turns out we did not read far enough in a notice from Lemons Tech Service regarding their LemonAid Loader. It will work on a CTR 41 after a slight modification. Lemons Tech Services will provide all CTR 41 owners with the instructions and a resistor, for free! Just drop them a note saying that you need the modification, plus they will include extra information on how to turn the CTR 41 (or CTR 80 or CTR 80A) into a great game or other computer sound monitor. Those of you without the LemonAid Loader can get the same information for $1.00 and a SASE. Lemons Tech Services is at P.O. Box 429, Buffalo, MO 65622. Sorry for the confusion.

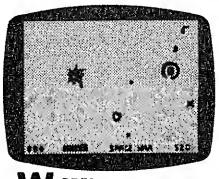
Earlier Model III Owners

In order to run some software on the TRS-80 Model III, the computer must have the control character generator in ROM. Most Model III's have this feature, but a few of the earliest models manufactured cannot generate a control character using the shift downarrow. If your computer does not have the generator, the best solution is to get it modified at a Radio Shack repair center. The cost is about $20.

No more for now, hope your Thanksgiving is joyful. ■

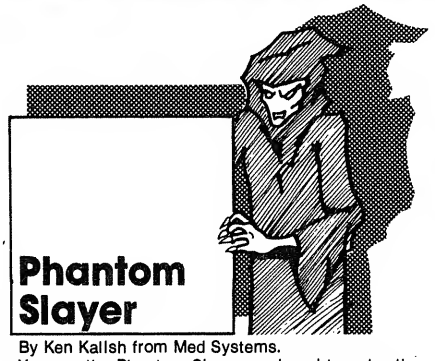
Fall Software Favorites
For the TRS-80 Color Computer

Invader's Revenge
By Ken Kalish from Med Systems.
You are the ***last*** space Invader—humans have destroyed all the others—and you're out for REVENGE! Wipe out as many as you can, avoiding their lasers and photon blasts. Multiple skill levels; 1 or 2 players; extended BASIC not required. Machine language, hi-res graphics, great sound.
16K Tape, $19.95



Color Space War
From Spectral Associates
You command the last combat Viper, and must break through the defenses of the Death Star while avoiding the pull of gravity of the Black Hole. Watch out for space mines and enemy ships. Extended BASIC not required. Joysticks.
16K Tape, $21.95

Madness and the Minotaur
From Spectral Associates
Classic adventure game with 200 rooms, assorted friendly and dangerous creatures, 8 magic spells and —of course—treasures. The computer obeys two-word commands such as "get lamp" to move you through your journey. You must enter the castle of King Minos, descend into the labyrinth and collect all the treasures you can.
16K Tape, $19.95



Phantom Slayer
By Ken Kalish from Med Systems.
You are the Phantom Slayer, assigned to enter the deadly Catacombs and destroy the mutant Phantoms. You're armed with a laser pistol and proximity detector, but be careful—the Phantoms' touch is ***fatal!*** Real-time machine language game with hi-res 3-D graphics and sound. Multiple skill levels; extended BASIC not required.
16K Tape, $19.95

Scepter of Kzirgla
From Rainbow Connection Software
Real-time graphics adventure game with arcade sound for the color computer. 13 floors of dungeon with monsters, treasure chests, hidden trap doors . . . even a flying magic carpet! All in your quest to find the Scepter of Kzirgla. Whatever you do, don't get caught in the poisonous gas cloud! Extended BASIC required.
16K Tape, $16.95,
16K Disk, $21.95

TRS-80 Color Basic
By Bob Albrecht from John Wiley & Sons
Step-by-step guide to the unique color, sound and graphic capabilities of your new Color Computer. No previous experience is required. Teach yourself BASIC—there's a whole chapter on typical programming problems and solutions.
Softcover, $9.95

Color Bonanza
From Soft Sector Marketing.
Six tapes, filled with programs to delight every color computer user! You'll find games that are fun, fascinating, challenging. Learning programs to interest the whole family. Utilities to help organize your home or office, and learn more about programming your computer. Truly a BONANZA, for hours and hours of home entertainment—**50** programs in one package!
6 Tapes, 8K-24K, $49.95

Moon Lander

By Greg Zumwalt from American Small Business Computers
Pilot your spacecraft over the moon's landscape and try to land it amid the mountains and craters. While carefully controlling your fuel consumption, use your joysticks to maneuver your craft and control your velocity against the forces of gravity. Be careful to avoid the asteroids drifting through space.
16K Tape, $14.95

Ghost Gobbler

From Spectral Associates
In this new and exciting version of the popular arcade game, use your joysticks to move your Ghost Gobbler through the maze, eating dots and power pills to score points. 8 bonus shapes, super sound, and 16 skill levels. Extended BASIC required; joysticks.
16K Tape, $21.95

Master Control

From Soft Sector Marketing
This is a BASIC language program designed to decrease typing time and error while providing direct control of motor, trace, audio and run. With Automatic Line Numbering and a custom key you can re-use or change at any time; plus 50 preprogrammed command keys. Can be used on a 32K system.
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Telecommunications

An overview of what's possible

All Models

Donald Stoner, Bellevue, WA

Unless you have been living under a rock, or panning for gold in the Yukon, you are aware that telecommunications is one of the most exciting areas of personal computing, whether you have a TRS-80 or not.

For the benefit of cave dwellers, a few words regarding telecommunications are in order. With a suitable device, called a modem, it is possible to connect your computer to the national telephone circuit. The applications are almost without limit. One of the most basic uses is to communicate and exchange information with a friend who is also equipped with a modem. You can send and receive electronic mail through various message systems, or you can join one of the larger data bases and access enormous amounts of information.

How Does It Work?

Essentially, a modem converts the ones and zeroes running around inside your computer into tones which can be sent over the telephone network. The modem at the other end recognizes these tones and converts them back into the original ones and zeroes.

The other modem works the same way, except that it employs a different set of tones. This is necessary so that the two signals don't "clobber" each other. Which set of tones you are using is determined by whether you are in the originate or answer mode. These terms have nothing to do with who places the call, or who answers the telephone.

Modems

There are two types of modems: acoustic and direct-connect. You have seen pictures of the acoustic type, with the telephone handset plugged in the rubber cups. The performance of acoustic modems is poor compared to direct-connect, and they are now pretty much obsolete.

Direct-connect modems are coupled directly into the telephone line, which eliminates acoustic losses and noise. The most popular type is called Bell 103 compatible and sends characters over the phone line at 300-baud (approximately thirty characters per second). Almost without exception, modems that meet the Bell 103 standard are capable of "talking" with each other, regardless of who manufactured the unit, or what type of computer it is connected to. This allows you to communicate with a friend who has an Atari, Apple, or other type of computer. The codes sent between machines are called ASCII, and are pretty much standardized by international agreement.

You are probably hearing about 1200-baud modems these days. The first-time user of 300-baud is awestruck to see characters on the screen that come in from the phone line. However, once you have seen 1200-baud (approximately 120 characters per second), you are contaminated forever. Data at 300-baud seems to creep across your screen.

One's desire for 1200-baud is soon dissipated upon seeing the price. Bell 212A modems (the most popular standard) sell for upwards of $500. A combination Bell 103/212A modem, such as the D.C. Hayes newest offering, sells for $695.00. Other, more exotic models are priced at $1000, or more!

There is another Bell standard 1200-baud modem called Bell 202. Unlike the other Bell standards, one cannot send and receive at the same time. This is called half-duplex. However, Bell 202 modems sell in the $200-300 range. They have never been very popular because the national telephone networks do not support this standard. This situation may change in the near future,

since the semiconductor manufacturers are gearing up to produce Bell 202 modem integrated circuits (chips) at very low cost. You should see Bell 103/202 combination modems for less than $200 by the end of this year.

Other Standards

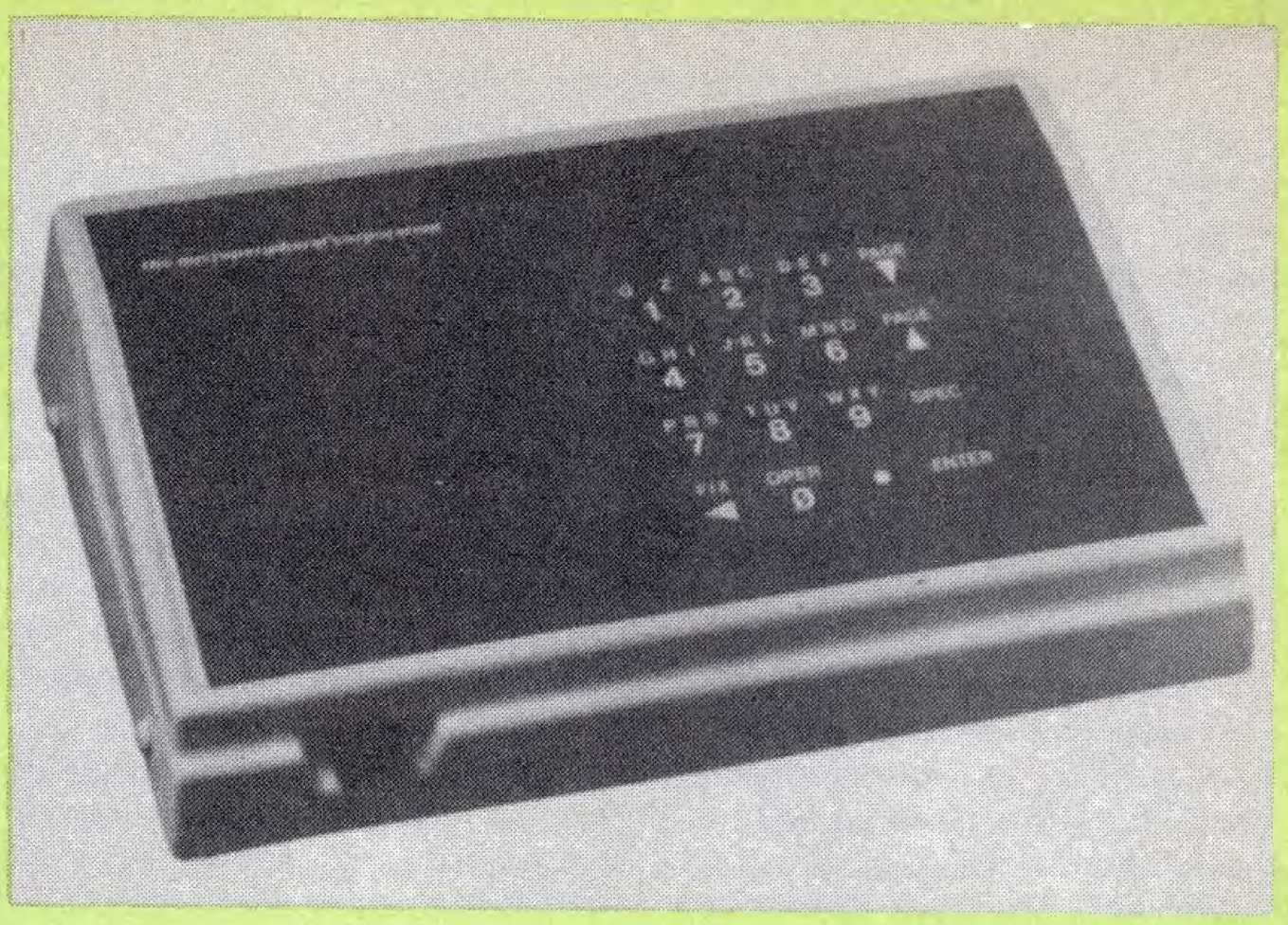
The introduction of British-type videotex systems in this country (notably Prestel) has brought with it a new standard. In Europe, it is called V.23. This standard is based on the fact that most users will be sending at keyboard speed, yet want to receive the incoming data as rapidly as possible. Thus, V.23 sends data at a very slow baud rate (75 baud) and simultaneously receives at 1200 baud (full duplex). It is a very practical system and modems for the V.23 standard can be made at very low cost.

One local company has developed its own 1200-baud standard to reduce the cost of high speed transmission even further. The Micro-Peripheral Corporation has recently introduced a home information terminal called the bankbox™. It interfaces to a television set just like a video game. It incorporates a self-contained direct-connect modem which plugs into the telephone line. The television screen displays incoming characters or graphics at 1200 baud. Most amazing, the device sells in large quantities for less than $100.

New Modems

Modem development has gone in two directions, i.e., either extremely low cost battery-operated devices, or intelligent units containing a CPU, memory, and so on. The Signalman is an example of the former. It is available for less than $100, complete with an RS-232 cable. At this price, no one can complain that a modem is too expensive.

The Radio Shack Modem II and the Hayes Smartmodem are examples of the latter device. Communications between modem and computer (or terminal) is carried on the RS-232 line. For example, if you wish the unit to dial (either tone or pulse), one simply types the appropriate commands on the keyboard. The Hayes unit is totally switchless.



Donald Stoner is Vice President of Engineering at MicroPeripheral Corporation. The company is a leader in telecommunications and the design of communication equipment for computer systems. They have just released a $100 home information terminal called the bank box™.

The terminal features 1200-baud (120 characters per second) data reception, color graphics, direct cursor addressing, voice channel, Touch Tone® dialing, and Touch Tone data transmission.

The bank box contains a CPU, screen memory, an eight color video controller for screen management, an integral 1200-baud direct connect modem, and a built-in radio frequency (RF) modulator which delivers Videotex information to television channels three or four.

Current options include a magnetic stripe card reader, a serial printer port, a cassette port (for long-term data storage), and an alphanumeric keyboard. The price to volume purchasers is $99.47—less than the cost of a 300-baud modem.

The bank box is available to large system operators, such as banks, brokerage houses, Videotex systems or electronic news organizations, requiring two-way interactive communications with their customers.

The Microperipheral Corporation supplies the host system and Touch Tone decoder modems. Also available is a Scratch Pad™ computer to manage telecommunications and multi-tasking between the user base and a mainframe system.

The bank box was developed as a low-cost, high-speed alternative to home computers for electronic in-home banking. By connecting the bank box to a telephone line and a color, or black and white, television set, the user may dial a bank to transfer funds, pay bills, query account balances, and receive bank product information and analysis in the home or office.

Banks may offer additional information services such as financial planning; tax information and preparation assistance; data on stocks, bonds and commodities; news and sports information; weather; etc. The optional features expand the bank box applications to include point-of-sale terminals, in-home electronic shopping, inventory entry and control, remote payroll processing, insurance or mortgage calculations. ■

The bank box™ (patents pending) is the registered trademark of the MicroPeripheral Corporation, 2643 - 151st Pl. NE, Redmond, WA 98052.

All setups are done from the keyboard. The Radio Shack modem can be controlled from local switches, or from the keyboard. These intelligent modems are priced in the $250-300 range.

Other products in the intermediate price range ($150-200) include the Microconnection, Bizcomp, and UDS modems. Some models feature autodial/autoanswer for less than $200.

What Do I Do With It?

If you have just purchased a modem, or are about to do so, you probably have a lot of application questions, the principal one being, "What can I do with it?" The answer (or rather, answers) to that question could fill up this entire issue. I will try to provide you with an overview.

Bulletin Boards: Local access bulletin boards have sprung up like weeds all over the country. For those not familiar with this phenomenon, an individual, or company, will attach an autoanswer modem to their computer. They run software which, essentially, allows the person calling in to operate the remote computer. This is called host software. When using this type of system, one can leave and retrieve messages, download software, and even communicate with the system operator.

Many of these systems are up twenty-four hours per day, while others come on-line in the evenings, or after business hours. The list is far too long to publish here, but if you call (305) 427-6300, you can download, or copy to your printer, a very complete, up-to-date list.

Access to these bulletin boards is usually free. When one realizes that providing this service means tying up to an expensive computer and peripheral equipment, these system operators (or SYSOPS, as they are called) certainly deserve a pat on the back.

There is something for everyone. Besides the usual message systems, there are special interest telephone numbers for those interested in cameras, airplanes, genealogy, guns and so on. There are even sexually oriented bulletin boards for gays, and folks of various other persuasions.

Networks: Calling one of these bulletin boards often involves a long distance charge. This can become rather expensive, if you do it often. However, there are a number of so-called value-added data carriers that can eliminate the need for long distance calling. These services connect commercial databases around the country to a local phone number in your area. The most popular value-added carriers (VACs) are Telenet, Tymenet and CompuServe.

Charges for using these networks average about $5 per hour, which is considerably less than the price of a long distance telephone call.

Commercial Data Bases: Whom do these carriers connect to? Again, the list is virtually endless. For a listing of individual commercial databases, you may wish to subscribe to the "Directory of Online Databases." It is published by Cuadra Associates, 2001 Wilshire Blvd., Suite 305, Santa Monica, CA 90403, telephone (213) 829-9922. The subscription price is about $75 per year. The latest issue has 919 entries, covering 1133 databases.

Some of the more famous databases include General Electric Information Service, Lockheed Corporation "Dialog", Mead Data Services, and the New York Times Information Bank. You can also access the National Health Service in Bethesda, Maryland, or the Poison Control Center in Atlanta, Georgia. Attorneys will be interested in Lexis, from Mead Data Central, and Westlaw, from West Publishing. Most of these commercial databases are extremely expensive and out of the range of the computer hobbiest.

Popular Databases: There are presently two extremely large popular databases: The Source, and CompuServe Information Service. By popular, I mean they are designed to be used by the general, unsophisticated computer public. As defined, Dow Jones News Service would also fit into this category, but most of their news is directed to those interested in financial information.

Both The Source and CompuServe have plenty going for them, and I belong to both networks. I appreciate the low cost of storage on CompuServe, and find the TRS-80 bulletin board (R MNET80) to be very useful. I am the system operator for a modem user-group called R MCONN.

The Source is slightly better known than is CompuServe. The signup fee for The Source is $100, and memberships have been available in most computer stores for some time. Originally, the system was keyword oriented, and not particularly user-friendly. They also grew much too fast for their equipment and, as a result, response time was an abomination. This year, they have added more equipment, and started using selection menus. The service is excellent and well worth the charge. For additional information on joining The Source, inquire at your favorite dealer, or contact Source Telecomputing Corporation, 1616 Anderson Road, McLean, Virginia 22102. Their toll-free number is (800) 336-3366.

Membership in CompuServe is only $5. Until recently, it was necessary to purchase the membership at a Radio Shack store. This has tended to make CompuServe very TRS-80 oriented. For example, their entry format is in 32-character mode, which is ideal for the TRS-80 Color Computer and videotex terminal. However, I understand that by the time you read this, memberships will be available in most computer stores, which will start to attract other computer users.

Many first-time users of CompuServe are not even aware of the multitude of services available, and they never get beyond the 32-column menus. Once in the personal computer section (command level), you can use disk storage (128K bytes at no extra charge), program in all of the popular languages, use cross assemblers, and many other useful utilities. Be sure to order the system guide in order to make maximum use of this outstanding system.

The preceding information represents only the highlights of things of interest to modem users in 1982. Hopefully, this time next year we can tell you all about the new $200 Bell 212A modems and other technological breakthroughs that have occurred since you read this article. ■

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Communicating by computer

An introduction to the CompuServe Information Service

All Models

Al Mashburn, Gig Harbor, WA

A few months ago, I noticed that I felt a bit closed in. I would go up to my computer room and spend hours typing away, letting the world go by. I had a meaningful relationship with my TRS-80, but alas, as with most relationships, boredom set in.

I began to see messages like, "Why don't we ever go out?" and "I never have anyone to talk to." I know the danger signs, so I immediately set out to do something about it. I had seen the ads for CompuServe, so I drove down to my local Radio Shack to find out a little more about it.

I learned that CompuServe Information Service, or CIS, has authorized Radio Shack to sell the Videotex/CompuServe Kit consisting of a users manual, your identification number, password and one hour of free time on the service. In the case of Model I/III, the package (catalog #26-2220) includes a smart terminal program. In order to use Videotex on a Model I or III, you must have at least 16K of memory and be using Level II or Model III BASIC. Of course, a telephone modem is needed, and with most modems, an RS-232 interface is necessary.

On my own system, I use a Comm-80 from MicroMint and the Radio Shack direct-connect modem (catalog #26-1172). They retail for $159.95 and $149.95, respectively. The Comm-80 is a good choice for people that either don't want, or can't afford, an expansion interface, but need RS-232 and 8-bit output. A Centronics-style parallel printer will plug right into the unit without special cables.

This brings us to the last piece of hardware—the printer. While you don't *need* a printer to use the system, remember that while on the service, the charges are by the minute and there is a lot of information to get down. Taking notes could be a very expensive drawback.

Hooking up the hardware was easy. The program loaded without a hitch. In fact, the worst part was the waiting because the hours of the service are 6:00 p.m. to 5:00 a.m. weekdays, and all day Saturday, Sunday, and major holidays. The few hours I had to wait gave me time to clean up my office.

At 6:00 p.m. I was ready to go. I opened up the envelope containing the user number and password. I looked up my nearest phone number. There are about fifty cities that have direct phone lines to CIS. Another 191 have access through Tymnet. Tymnet is an independent network contracted by CompuServe to arrange hookup for users not directly served by them. An additional $2 per hour is charged by Tymnet on top of the $5 per hour for CompuServe *($22.50 for prime time calls to CompuServe —Ed.).*

I dialed the phone. When I heard the high-pitched tone on the other end, I turned on my modem and my first message appeared on the screen. Tymnet asks a few questions and then asks for the password. I confidently entered my password. "Wrong password. Try again." I panicked—maybe they gave me the wrong password! I tried again. "Wrong password. Try again." In a fit of sheer desperation, I read the instructions. Oh, Tymnet requires the use of a different password. It's right here in the instructions. Yeah, I knew that. I just forgot.

With the correct entry, I was able to breeze right into CompuServe, where I was able to use *my* password. During the free first hour, you are given a chance to set up an account, using your Visa or MasterCard. If you don't have these cards, other arrangements can be made. If

you choose not to at this time, there is a brief description of what's new. Then the main menu is shown.

The database of CompuServe is best described as a pyramid of indices. When a menu choice is selected, that choice may contain many more menus. The services offered are far too numerous to list here. They include theater reviews, games, news summaries, electronic mail, even pork prices.

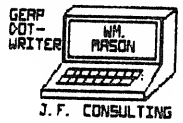
Once on-line, you can order an index of services for $1.50. By using the page numbers in this index, and the GO command, a page can be accessed directly without going through the menus. The use of the GO command can save a lot of time, and when on the system, time is money. If you get really lost, entering a T will take you back to page one, the main menu. The system is very forgiving and will allow just about any mistake without causing any problem. If, for some reason, you manage to get locked in some sort of loop, and just can't get out (as I have), Control C will stop any function that the host computer is performing and wait for a command.

One of the options on the main menu is Micronet. Micronet is actually a system within a system. Entering this area puts you in a totally different environment. The familiar menu and page number system used in the database isn't used here. Micronet uses prompts that expect specific commands from the user to move around in the system. If this sounds complicated, don't worry. A very good users manual is available that can be ordered on-line for $4.95.

A few of the features in Micronet are: 128K of file storage, file transfer between users, more games, FILGE (a file generator and editor program), and use of different programming languages, such as Pascal or APL. It would be safe to say that Micronet tends to stay on the more serious side of computing, while the database part of CompuServe is meant for fun and entertainment.

I feel that CompuServe is very well worth the price of the software and signup fee. It is an excellent way to reach out with your computer and communicate with people that share your interests. The fun of reading a newspaper from across the country, or sending a letter by electronic mail, can make it very worthwhile. For over 200 cities, it is a local phone call away.

One last hint. Unless you are a Getty or Rockefeller, go down to the store, buy a clock, and put it on top of your computer. Time has a way of slipping away while on-line and the hours really do seem like minutes. Keep an eye on the time. Nothing takes the fine glow off of computer communications like having your spouse burn your TRS-80 with the latest charge card billing—especially if you are still sitting at it! ■



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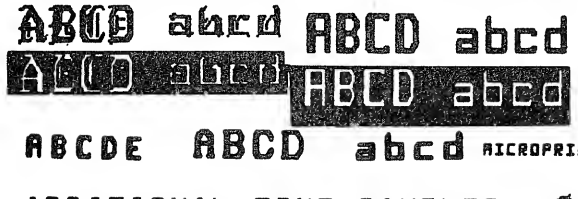
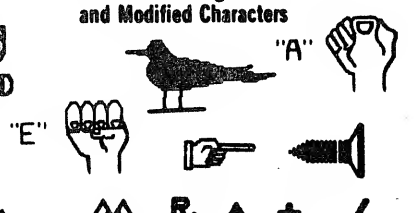
SAMPLE CHARACTER FONTS



SAMPLES - High Res and Modified Characters



ADDITIONAL FONT SAMPLES ABCDEFGHIJK

Computer Style ABCD abcd fghijklmnopqrst

Mesquite x2 ABCD abcd Mesquite x0 !"#$%™'

GEAP - The ULTIMATE in TRS-80 Graphics. GEAP 2.1 has instant graphic letters. Create your own screen graphics easily by; Magnifying, Reversing, Multiplying, Rotating, Merging and much more. Then let GEAP CREATE a BASIC program to recreate your graphic masterpiece! Numerous EXPANSION modules give GEAP limitless power. EPSON/OKIDATA/ Radio Shack LPVI printer block graphics; Radio Shack LPIV graphics ready soon! QUICKCURSOR with 2, speed controllable cursors, instant line, rectangle and circle. NEWSCRIPT interactive expansion module. Much more! There is NO other graphic utility on the market that is as POWERFUL, VERSATILE and EASY TO USE as GEAP 2.1 $49.95

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GEAP 2.1 + DOT WRITER $99.95
DOT WRITER 1.5 only (includes 11 fonts) $69.95
EXTRA Fonts Available - $30 for disk of 7-10 fonts
We also carry NEWSCRIPT 7.0, The best TRS-80 Word Processor. $124.95; FASTER, BASIC code optimizer $25.95 and RPM, Disk Speed monitoring program $24.95.

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MOD I/III

YOU CAN'T BEAT GEAP! MC/VISA

13

Terminal and modem packages

A shopper's guide

All Models

Jim Klaproth and Don Scarberry

The purpose of this article is to show what features are available in various terminal programs that are on the market. An attempt was made to include all commercial programs known to us and vendors were given the opportunity to submit their software or specifications to us for evaluation. Those who responded are included in our comparison chart and summary. Others are listed in our supplier's list. We apologize to anyone who may have been overlooked.

We will begin by explaining briefly each of the features in the order they appear in the comparison. This is not a tutorial on communications, so the reader is assumed to have some knowledge of the subject. There is also a brief synopsis of each of the packages that were evaluated.

Features

Price, model computer, supplied on— These are self-explanatory.

Support 1200-baud— This refers to the ability of the software to function at the Bell 212 standard of 1200-baud. Most of the packages functioned at 1200-baud; however, not all of the features worked properly. The most frequent problem was with slow printers dropping characters at the higher baud rates. Some of the better packages have a small buffer to minimize this.

Auto dial— Some of the packages include an automatic dial function for those modems that support autodial. Users with the Hayes Smartmodem may utilize autodial with any terminal program by manually giving the proper commands.

Auto buffer — This is a powerful feature found on most of the packages. The sending host computer sends a control character before and after transmitting the actual data. If the terminal has auto buffer capability, it automatically opens and closes the memory buffer.

Auto linefeed toggle— Some host computers require the terminal to send a linefeed after a carriage return, others do not. This option allows the terminal to send linefeeds after carriage returns if required to do so.

Auto log-on message— Some of the packages allow a one-line log-on message to be sent by pressing a certain key. Instead of having to type "Jim Klaproth; password; Puyallup, WA; Y; R; P; Q" (or similar) each time, simply press a key and it transmits the predefined message.

Receive buffer— This is a reserved portion of the computer's memory, set aside for receiving downloaded data from the host computer.

Save buffer to disk— Most programs will allow the user to save the received data to disk or tape (if a tape-based system).

Load buffer to disk— Here, we are loading the buffer from disk (or tape) in preparation for sending (uploading) to the host computer.

View buffer— This refers to the ability to see the contents of the buffer while on-line. This is useful when you need to verify that a file loaded properly into the buffer.

Transmit buffer— This gives the terminal operator the ability to send data in the buffer to the host computer.

Prompted send mode— Prompted send refers to the way in which the data is sent to the host. Most bulletin board service (BBS) systems, in order to insure good uploads, use a prompting system whereby they receive a line of data, then transmit a prompt character when ready to receive another line. The terminal program must have the ability to send a line, stop and wait for the agreed-on prompt character, and then send another line. This assures a good upload every time.

Send/receive binary files— The RS-232 protocol demands that the data which is sent be in ASCII format. This means that BASIC programs, saved in ASCII format (,A), can be sent and received with no problem. However, machine language programs and BASIC programs saved in compressed format cannot be sent directly without conversion. Some of the terminal programs have auxiliary utilities that convert the files and some even have automatic translation built in.

Print the buffer— Some of the packages allow a separate operation that enables the printer to print the contents of the buffer.

Append to buffer— This allows the buffer to be added to without destroying the previous contents.

Route video to printer— This feature enables the line printer (most programs only support parallel printers) to print whatever

appears on the screen.

Screen printer— Allows the operator to make a hardcopy of the contents of the screen. Most of the packages allow users of disk operating systems that support a screen print function to utilize it.

Set RS-232 parameters— Most of the packages allow the user to reset the baud rate, word length, parity, stop bits, and linefeed option right from the terminal program. The ones that do not use the switch settings on the RS-232 board or else use preset parameters.

Upper/lower case— Most will support upper- and lowercase characters.

Set half/full duplex— This refers to the mode of operation. In half duplex, data is sent and shown (echoed) on the screen locally. In full duplex, the echo comes from the other computer.

Send control characters— Certain control characters may be sent and received by using the shift downarrow, plus a letter. For example, shift downarrow-G will ring a bell on terminals equipped with such hardware.

Send special characters—Some large mainframe computers require the terminal to send special characters not found on the TRS-80 keyboard. By pressing a certain combination of keys, special characters may be sent by some programs.

Display status— This handy feature displays all of the RS-232 parameters, the printer status, and any other useful information.

Set video parameters— This allows the operator to set the screen width to other than 64 characters per line in order to receive properly formatted displays from other computers.

Alter translation tables— Translation tables are used to convert data from one form to the other. The ability to alter, or load in, new tables allows maximum flexibility.

Programmable keys— This allows the user to alter or define certain keys in order to send special character, log-on messages, etc.

Execute DOS commands— Some programs allow the use of most of the resident DOS commands (a directory, for example). This is in addition to any DOS function built into the DOS.

Help menu— Most programs have a menu of commands which can be displayed at the press of the keys.

Documentation— Rated G (good), F (fair), P (poor), this is mainly a subjective evaluation based on how quickly and easily information can be located and the depth of the material.

Host program included— Some packages include a host program in order to allow your computer to act as a host computer.

Disk/tape file transfer— Some of the packages include a utility that allows a direct disk-to-disk or tape-to-tape transfer. This allows files larger than memory to be exchanged, and often with much greater speed. These utilities are generally incompatible with other similar ones, meaning both computers must be running the same file-transfer utility.

Synopsis of Programs

ST80III— Written by Lance Micklus, this is one of the oldest, most well-received communications packages for the TRS-80. It could be called the standard against which all others are judged. It has some unique features, like a SLEEP mode, whereby the incoming data is ignored until it matches a predefined string. At that point, ST80III will activate until it receives ZZZ, which puts it back to sleep.

While communicating with Micklus' Mouse-Net™ Bulletin Board System, ST80III will automatically send its owner's serial number, test the integrity of the line, and automatically send and receive special control commands. It has the best documentation, is completely debugged, and is user-friendly. It is also available for the Model II in either TRSDOS or CP/M format for $250.

ST80DUC— This appears to be a stripped-down version of ST80III. It even uses the same menu. However, the commands that are missing are marked "not used" in the menu. Compare the features in the comparison chart to see if this one fits your needs.

OMNITERM— Several reviewers have called Omniterm the most serious competition for ST80III. It lacks a screen-print function and DOS command utility, both of which can be overcome by using NEWDOS/80. It has a very useful, unique 2048-byte on-line buffer that allows you to scroll backward to see information that you may have missed as it scrolled off the screen. The seven translation tables provided with this package make it very flexible. A large graphic bell is displayed when Omniterm receives a control-G, along with an audible beep if an amplifier is connected to the cassette port. Excellent documentation rounds out an excellent value.

SUPER TERMINAL— This package from Instant Software is identical in every way to Omniterm. More companies are utilizing the advantage of a mass distribution organization in addition to marketing their products through their own outlets.

MODEM80— This has to be one of the best values on the market. It lacks a prompted send mode, which prevents it from being used to upload to some bulletin board systems. However, it includes a host program and a direct file transfer utility that enables it to transfer files directly from disk to another computer equipped with the same program. For $40, how can you go wrong?

ACEMAIL— This program is not exactly a smart terminal program, but it can be utilized as one. It is a unique automated electronic mail system. It is designed to be used strictly with the Hayes Smartmodem. The function of Acemail is to allow a computer system to send and receive electronic mail automatically, without the user being present. Normally, the program is in host mode awaiting the arrival of mail. The real time clock is polled constantly, and when a preset time is reached, the program goes into automatic terminal mode, dials a predetermined number, logs on, sends the mail, disconnects, and returns to host mode for another call. This can save hundreds of dollars in toll charges by sending the mail at 3:00 a.m. when the rates

Table 1
Terminal Packages

Features	ST80III	ST80DUC	OMNITERM SUPER TERMINAL	MODEM80	ACEMAIL	UNITERM UNITERM/80	COMMWHIZ	RADIO SHACK	D.D.S.	T.D.S	ULTRATERM	STERM	NEWTERM/80	COLORCOM/E (ROM Pak)	SUPER COLOR TERMINAL[6]	COLORCOM/E (Disk)	COLORTERM	MICROTEXT (ROM Pak)
Price	$150	$75	$95	$40	$79	$80/90	$80	$40	$76	$40	$79	$75	$50	$49.95	$39.95	$49.95	$34.95	$59.95
Computer model	1/2/3	1/3	1/3	1/3	1/3	1/3	1/3	1/3	1/3	1/3	1/3	1/2/3	3	CC	CC	CC	CC	CC
1200-baud capability	Y	N	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y[5]	Y	N	Y
Supplied on (disk, cass., ROM)	D	D	D	D	D	D	D	C	D	C	D	D/C	D	R	C	D	C	R
Auto Commands																		
Auto dial	Y	N	Y	N	Y	N	N	N	Y	N	Y	N	N	Y	Y	Y	Y	Y
Auto buffer	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	N	Y	N	N
Auto linefeed toggle	Y	Y	Y	Y	N	Y	N	N	Y	Y	Y	Y	Y	Y	N	Y	N	Y
Auto log-on message	Y	N	Y	N	N	Y	Y	N	Y	Y	N	N	Y	Y	N	Y	Y	N
Buffer Commands																		
Receive buffer (download)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y[3]	Y
Save buffer to disk/tape	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	T	Y	D	T	T
Load buffer from disk/tape	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	T	T	D	T	N
View buffer	N	N	Y	N	N	Y	Y	N	Y	Y	N	N	N	Y	Y	Y	Y	Y
Transmit buffer (upload)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y[3]	N
Prompted send mode	Y	Y	Y	N	Y	Y	Y	N	Y	Y	Y	Y	Y	N	N	N	N	N
Send/receive binary files	Y	N	Y	N	N	Y	N	Y	Y	Y	Y	N	Y	N	Y	N	Y	N
Print the buffer	Y	N	Y	N	N	Y	Y	N	Y	Y	N	Y	N	Y	Y	Y	Y	N
Append to buffer	Y	Y	Y	N	N	Y	Y	N	Y	Y	N	Y	Y	Y	N	Y	Y	Y
Printer Commands																		
Route video to printer	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	N	N	N	N	Y
Screen printer	Y	Y	N	N	N	Y/80	N	N	N	N	N	N	N	N	N	N	N	N
Configuration Commands																		
Set RS-232 parameters	Y	N	Y	Y	N	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Upper/lowercase	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Set half/full duplex	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Send control characters	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Send special characters	Y	Y	Y	Y	N	Y	Y	N	Y	Y	Y	Y	Y	Y	N	Y	Y	Y
Display status	Y	N	Y	Y	N	Y	Y	N	Y	Y	Y	Y	Y	Y	N	Y	N	N
Set video parameters	Y	N	Y	N	N	Y	Y	N	N	N	N	Y	N	N	N	Y[1]	Y[2,4]	N
Extra features																		
Alter translation tables	Y	N	Y	Y	N	Y	N	N	Y	N	N	Y	Y	Y	N	N	Y	N
Programmable keys	Y	N	Y	N	N	N	N	N	N	Y	N	Y	Y	N	N	N	Y	N
Execute DOS commands	Y	N	N	Y	N	Y	Y	Y	Y	N	N	N	N	N/A	N/A	N	N/A	N/A
Help menu	Y	Y	Y	Y	N	Y	Y	N	Y	Y	Y	Y	N	N	N	N	Y	N
Documentation (G, F, P)	G	G	G	F	P	G	G	F	F	F	F	G	F	F	P	F	F	P
Host program included	N	N	N	Y	Y	N	Y	Y	N	N	Y	N	N	N	N	N	N	N
Disk/tape file transfer	N	N	N	Y	N	N	N	Y	O/$20	O/$20	Y	N	N	N	N	N	N	N

[1]Eliminates split words only
[2]High resolution 51 or 64 column x 21 lines
[3]Can send and receive data in encoded form
[4]Can protect partial screen from scrolling
[5]Up to 4800-baud
[6]Enhanced features on ROM pak $49.95, or disk $69.95

Table 2
Modems

Company Name	Model	Sugg. Price	Mode Type	Baud Rate
Emtrol Systems, Inc. 123 Locust St. Lancaster, PA 17602 (717) 291-1116	Lynx 1030/AA	$299.95	Direct Connect	300
Hayes Microcomputer Products 5835 Peachtree Corners E. Norcross, GA 30092	300 1200	$289.00 $699.00	Direct Connect Direct Connect	300 300/1200
KESA 774 San Miguel Ave. Sunnyvale, CA 94086 (408) 746-2738	O/A-300	$149.00	Direct Connect	300
Lexicon Corporation of Miami 1541 NW 65th Avenue Ft. Lauderdale, FL 33313 (305) 792-4400	Lex-11[1] Lex-12		Acoustic Acoustic/ Direct Connect	300 300
Micro Mint 917 Midway Woodmere, NY 11598 (800) 645-3479	MD01 (kit)	$42.00	Acoustic/ Direct Connect	300
Microperipheral Corporation[2] 2643 - 151st Place NE Redmond, WA 98052 (206) 881-7544	R1 R1A T1 Buss Decoding T1A TC1 Color Comp.	$159.00 $199.00 $209.00 $259.00 $199.00	Direct Connect Direct Connect Direct Connect Direct Connect Direct Connect	0-300 0-300 0-300 0-300 0-300
Novation 18664 Oxnard Street Tarzana, CA 91356 (213) 996-5060	CAT D-CAT Auto-CAT 212 Auto-CAT	$189.00 $199.00 $249.00 $695.00	Acoustic Direct Connect Direct Connect Direct Connect	0-300 0-300 0-300 0-300/1200[3]
U.S. Robotics, Inc. 1035 W. Lake Street Chicago, IL 60607 (312) 733-0497	Phone Link Micro Link 300 Auto Link 300 Micro Link 1200 Auto Link 1200	$149.00 $179.00 $219.00 $449.00 $549.00	Acoustic Direct Connect Direct Connect Direct Connect Direct Connect	0-300 0-300 0-300 1200 1200
Cermetek Microelectronics 1308 Borregas Avenue Sunnyvale, CA 94086	212A	$595.00	Direct Connect	300/1200

[1]Battery powered option available

[2]Some models include software

[3]Auto or manual speed detection

are cheap. There is also a chat mode while in host mode.

UNITERM and UNITERM/80 —The only difference between these two is that UNITERM/80 is designed to use all the extra features inherent in NEWDOS/80. This feature allows the use of all NEWDOS/80 commands. You can even run other programs, such as SUPERZAP, as long as they do not interfere with the memory area occupied by UNITERM. These are full-featured terminal programs. One unique feature is the ability to type directly to the memory buffer to add to the existing data in the buffer. The programs are attractively packaged.

COMMWHIZ— This is a relatively new program that is full-featured, yet easier to use than most. It has a continuous status display, user-friendly menu, and quick reference card for those who hate to read manuals. Not as flexible as some of the other programs, it is ideal for the casual BBSer, or CompuServe user, who doesn't need, or want, to know about translation tables or such. Just load and go! It also includes a direct file transfer program.

Radio Shack COMMUNICATIONS PACKAGE— No review would be complete without mention of Radio Shack's entry. This is a no-frills package for communicating with other TRS-80 computers similarly equipped. It can also be used as a terminal program to talk to BBSs. It includes a direct file transfer utility for disk and tape transfers between two similarly equipped TRS-80s. It is supplied on cassette, but is easily transferred to disk.

D.D.S.— These letters stand for Disk Download System, and this is definitely the sleeper among the smart terminal packages. As this was one of the final packages tested, my initial reaction was, "Oh, no! Not another me-too communications package!" As one can see from the table, it lacks very little, and is unique in a very useful way. It has the ability to alternate from terminal mode to Disk BASIC mode. Simply press the CLEAR key while in terminal mode and you are instantly in Disk BASIC with about 21K free space (48K system). Programs that are downloaded can be transferred from the buffer directly into the BASIC text buffer and immediately listed, run, edited, or saved. Press CLEAR again, and you are back in the terminal mode. A library feature allows files of up to twenty BBSs to be maintained and loaded automatically for auto-dial and log-on. An optional direct file transfer utility complements this excellent value.

T.D.S.— This is the cassette version of D.D.S. Besides being tape-based, it lacks the library features, the ability to alter translation tables, and execute DOS commands. This is an excellent value in a tape-based system.

ULTRATERM— Another full-featured program, this one also has a unique feature. It seems that the only way to break into this market is to offer a unique feature, or beat everyone's price. This program has a split screen feature that allows you to send output to the host, while it is still sending to you. The use of Micronet's C.B. Simulator is given as an example in the manual. It also includes a host program, a direct file transfer feature, and binary/hex conversion programs.

STERM— This is Howe's smart terminal program, and it is one of the few available for the Model II. It is supplied only in CP/M format, and costs $80. There is also a cassette version available for $70. The disk version supports cassette I/O for more versatility. When two computers communicate using STERM, they can verify the data being sent with a checksum. A handy feature is the ability to type data directly into the memory buffer. Another feature allows you to save a customized version of STERM to disk or cassette.

NEWTERM/80— This is a new program from Apparat. It is only available for the Model III at the present time. It is full-featured and a good buy at only $50. It is claimed to be able to work up to 19200-baud with no loss of characters. It has six user-defined messages of up to fifty-two characters each, and has a 256-byte circular printer buffer to minimize data drop-off when using a slow line printer. It comes in a blue binder that matches the NEWDOS/80 manual.

Color Computer Terminal Programs

All the Color Computer terminal packages functioned as advertised by the vendors, but there are some significant differences that should be considered when selecting one to suit your needs.

The configuration of your Color Computer will determine which terminal package is best for you. For example, if you have a 16K cassette-based system without disks or printer, either a cassette or ROM Pak terminal package should prove suitable.

Future plans to upgrade or add to your system may necessitate purchase of a package that provides for disk and/or printer output. If you are currently using a cassette system, and plan to upgrade to disks later, a cassette version might prove to be the best choice.

The ROM Pak will not allow simultaneous operation with the disk system since both require use of the expansion port. You can use one or the other, but not both. In this case, a cassette version of the program might be considered, because if you add disks later, the same program could be used.

An extremely useful function is the ability to route the incoming text to a lineprinter. Some packages require that the information be stored in a buffer or on cassette, then after transmission ceases, connect the printer and dump the text.

Microtext — This ROM Pak contains a 4-pin Din plug which allows a serial printer to be connected and print text as it enters the computer. The printer can also be controlled directly from the keyboard.

Colorterm — With this program from Martin Consultants you can configure the video screen to either 51 or 64 characters per line. This will be extremely useful when the Color Computer is used with a high resolution monitor. On a standard television set, however, the characters cannot be reproduced as clearly as they should.

Super Color Terminal — Nelson Software claims that their

ACCEL3

BASIC Compiler,
Model I/III, all DOS

ACCEL2 Plus:

- Bigger optimized subset ①
- Quicker compilation ②
- More compact output ③
- Almost total compatibility ④

developed in England
by Southern Software
ALGORIX
Allen Gelder Software

SPEED/SPACE Performance Table.

Speed Improvement (Ratio)				Operation	Space Degradation (Bytes)			
INT	SNG	DBL	STR		INT	SNG	DBL	STR
178	28	20	7.3	Assignment (LET)	−4	0	0	0
3.5	3.6	3.6	3.5	Array Reference (1-dim)	13	13	13	13
3.0	3.0	3.0	3.0	Array Reference (2-dim)	12	12	12	12
35	1.8	1.6		AND, OR	4	7	7	
23	2.0	1.6	6.6	Compare (=,>,<, etc.)	3	10	10	3
57	1.8	1.4	3.6	Add, Concatenate (+)	1	6	6	2
48	1.8	1.3		Subtract (−)	4	6	6	
1.5	1.5	1.1		Multiply (*)	6	6	6	
1.08	1.17	1.02		Divide (/)	6	6	6	
77	70	84	9.3	Constant Reference	0	6	4	4
7.1	1.9			FOR—NEXT	6	23		
111	6.8	4.8		POKE	−1	5	5	
10	4.5	3.6		SET, RESET	−1	5	5	
47	4.6	3.0	8.1	IF THEN ELSE	3	9	9	3
33	4.3	3.5		ON expression GOTO	−2	0	0	
50	6.8	5.1		ON expression GOSUB	0	3	3	
1.2	1.01	1.03	1.2	PRINT simple-variable	−1	−1	−1	−1
61	5.0	3.7		OUT	5	11	11	
				Flow of Control				
	216			GOTO		−7		
	74			GOSUB/RETURN		−10		
				Functions				
inf	inf	inf	inf	VARPTR	−3	−3	−3	−3
5.2	1.9	1.7		POINT	3	9	9	
38	2.3	1.7		INP	5	8	8	
149	2.3	2.0		PEEK	0	3	3	
				String Functions				
		53		ASC				5
		258		LEN				0
		4.8		LEFT$				1
		4.7		RIGHT$				1
		6.4		MID$				2
		25		CHR$				0
		36		CVI				0
		16		MKI$				0
		7.1		CVS				0
		25		MKS$				0
		5.4		CVD				0
		16		MKD$				0

① Includes INP, OUT, multi-dimensional arrays.
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EDIT EDIT is to your line-editor as disk is to tape, lets you work and play in one more dimension. **$40**

package is compatible with their Super Color Writer. Super Color Writer is a word processor that can be used to create or edit Super Color Terminal files. We did not review their terminal package with the word processor, but it certainly warrants further investigation.

Terminal Suppliers

Ace Computer Products: ACE-MAIL, 1640 NW 3rd Street, Deerfield Beach, FL 33441, (305) 427-1257 voice, (305) 427-6300 (data).

The Alternate Source: MODEM80, 704, North Pennsylvania Avenue, Lansing, MI 48906, (517) 482-8270.

Apparat, Inc.: NEWTERM/80 and UNITERM/80, 4401 S. Tamarac Parkway, Denver, CO 80237, (800) 525-7674.

Computer Shack: DDS, TDS, DFT, and ULTRATERM, 1691 Eason, Pontiac, MI 48054, (313) 673-2224.

Howe Software: STERM (Howe Smart Terminal Program), 14 Lexington Road, New City, NY 10956, (914) 634-1821.

Instant Software: SUPER TERMINAL, Petersborough, NH 03458, (800) 258-5473.

Lance Micklus, Inc.: ST80III and ST80DUC, 217 South Union Street, Burlington, VT 05401, (802) 864-5899 (voice), (802) 862-7023 (data).

Lindbergh Systems: OMNITERM, 41 Fairhill Road, Holden, MA 01520, (617) 852-0233.

Mumford Micro Systems: TELCOM (not available for review), Box 400-E, Summerland, CA 98067, (805) 969-4557.

Radio Shack: COMMUNICATIONS PACKAGE, available at all stores and computer centers.

VolkMicro Computer Systems, Inc.: COMMWHIZ, 202 Packets Court, Suite C, Williamsburg, VA 23185, (804) 220-0005.

Spectrum Projects: COLORCOM/E, 93-1586 Drive, Woodhaven, NY 11421, (212) 441-2807.

Nelson Software Systems: SUPER COLOR TERMINAL, P.O. Box 19096, Minneapolis, MN 55419, (612) 827-4307.

Martin Consulting: COLORTERM, 94 Macalester Bay, Winnipeg, Manitoba, R3T 2X5, Canada.

The Micro Works: MICROTEXT, P.O. Box 1110, Del Mar, CA 92014, (714) 942-2400.

Table 1 gives those modem manufacturers who have provided us with information pertaining to their currently-available equipment. Special features and specifications vary greatly between the different brands and do not permit detailed listing. For more detailed information, you should contact the manufacturer, who will provide you with brochures, or recommend a dealer in your area. The prices shown are current at the time this article is written, and may vary. ■

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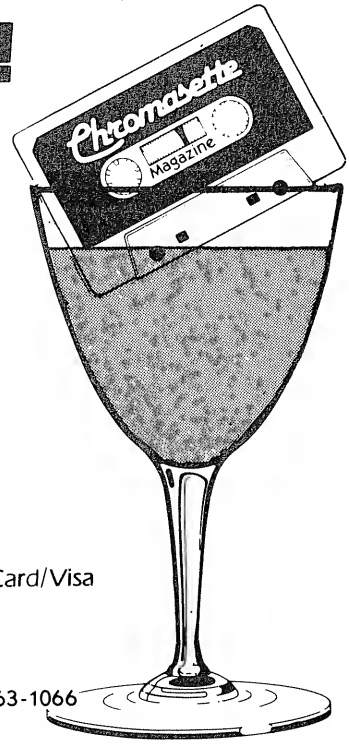

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TRS-80 Model I

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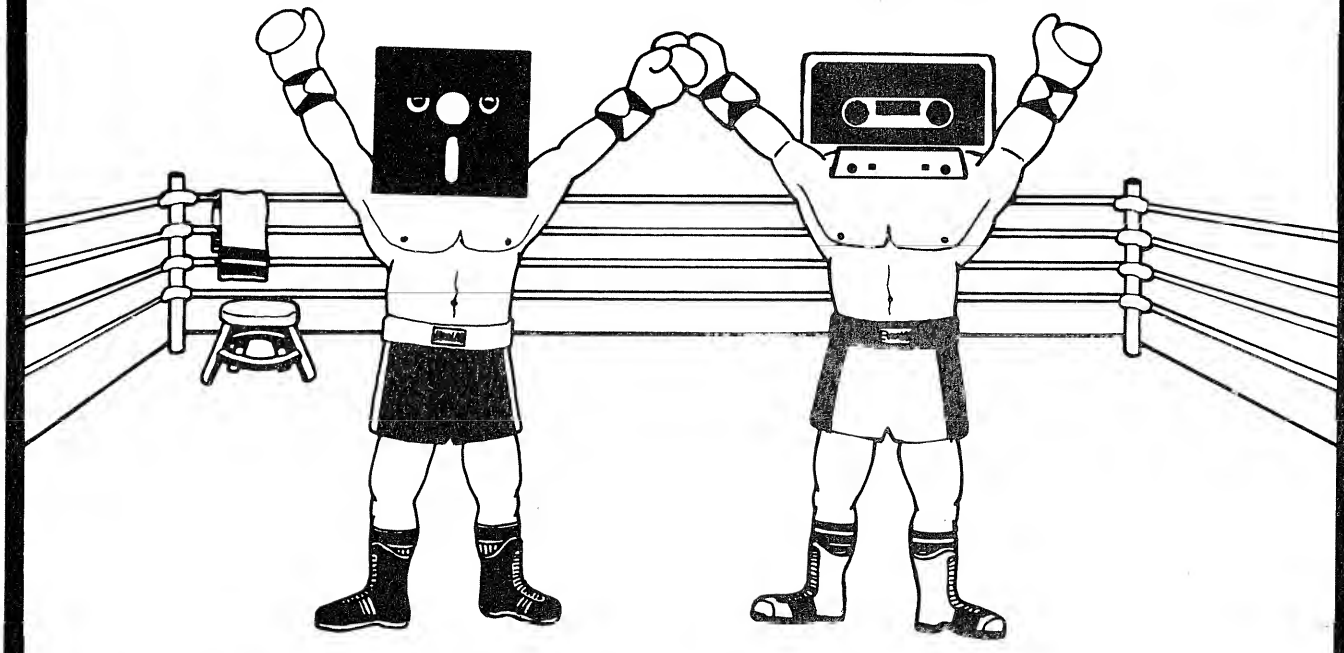

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Downloader

Store outside information on your own computer

Model I, PMC-80, LNW80

Robert Fink, Dayton, OH

If you're into telephone computer networks and especially the bulletin boards that have programs to exchange, Downloader is for you.

It's a simple BASIC program that sets up your modem and communicates in full duplex after you dial a bulletin board service. When you have gone through the protocol of sign-on and are ready to receive ASCII listings of programs directly to your computer's memory, the touch of a shift and uparrow starts incoming text lines to flow into your machine as if they were being typed in from the keyboard. When the text file has been completed, another shift uparrow returns control to BASIC <READY> and you can sign-off. Then you can save or run the program that is now in your machine.

How it Works

The main operations of the Downloader are performed by machine language USR subroutines. First, the modem is reset and configured for 300-baud, two stop bits, 8-bit word and no parity. If the systems you use are different, you'll have to change line 50050 to correct POKEs using your RS-232 manual.

The main loop waits for keyboard input to send a received UART character to the display. If you desire to delay or hold up input, hold the "@" key. Otherwise, a two-way (full duplex) dialog is maintained until you are ready to actually receive text and put it into machine memory.

To do that, hold the shift and the uparrow key together. Now, a USR subroutine will exchange the modem for the keyboard and all further text will be entered like BASIC code, as long as it has line numbers. The incoming code will be placed 'ahead' of the 50000 lines of DOWNLOADER. Any program with larger line numbers will not return directly to our modem communication loop. After the text lines are completed, hold shift and uparrow again and you're back in BASIC. Now do a RUN50000 to restart the communications loop so that you can say "Goodbye" to the bulletin board. Don't just hang up the phone, that's rude!

Now delete lines 50000-50260 and LIST, RUN and/or SAVE your received program to disk.

Final Comments

Use 61000 in answer to memory size when starting out, since the USR subroutines reside at the top of memory. The program is written for 48K but can be adjusted to 32K with changes to lines 50190 and 50200 as noted in Listing 1. The machine code is relocatable.

Listing 1 is all you need in BASIC but Listing 2 gives you the source listing for the two USR subroutines if you want to study them. Hope you get downloads of useful programs that make your efforts worthwhile.

Listing 1

```
50000 REM DOWNLOADER/ BAS FOR RS-232 C
  & MODEM
50010 REM ANSWER MEMORY SIZE WITH 61000
   (48K SYSTEM)
50020 REM A BULLETIN BOARD COMMUNICATOR
   & DOWNLOADER
50029 REM LOAD IN MACH. LANG. UART DRIV
  ERS
50030 CLEAR 1000:GOSUB50180:DEFUSR0=&HF
  000:DEFUSR1=&HF012
50049 REM SET UART TO 300 BAUD, NO PARI
  TY, 8 BIT WORD
50050 OUT232,0:OUT234,109:OUT233,BD
50060 PRINT"TERMINAL READY ....."
50070 PRINT:PRINT"HOLD @ KEY TO DELAY..
  .":PRINT"...SHIFT, UP ARROW TO BEGIN
  SAVE, AND & TO END SAVE"
50080 REM MAINLOOP
50090 A=USR0(0)
50100 IF A=0 THEN 50140
50110 A=AAND127:PRINTCHR$(A);
50120 GOTO 50090
50130 REM KEYBOARD INPUT
50140 REM
50150 IF PEEK(&H3801)=1 THEN 50150 ELSE
   A$=INKEY$:IF A$=""THEN 50090
50160 A=ASC(A$):IFA=27THENCLS:PRINT@63,
  "*":X=USR2(0)
50170 B=USR1(A):GOTO 50090
```

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It does have some limitations. It takes at least 8K of RAM to run the compiler and it does only support a subset of BASIC—about 20 commands including FOR, NEXT, END, GOSUB, GOTO, IF, THEN, RETURN, END, PRINT, STOP, USR (X), PEEK, POKE, *, /, +, -, > , < , =, VARIABLE NAMES A-Z, SUBSCRIPTED VARIABLES, and INTEGER NUMBERS FORM 0-64K.

TINY COMPILER is written in BASIC. It generates native, relocatable 6502 or 6809 code. It comes with a 20 page manual and can be modified or augmented by the user. $24.95 on tape or disk for OSI or TRS-80 Color.

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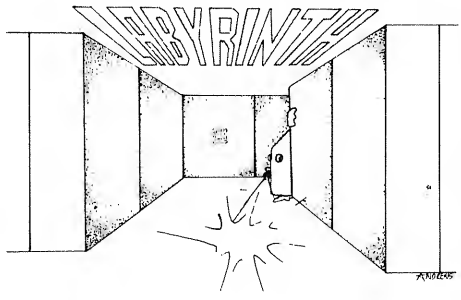

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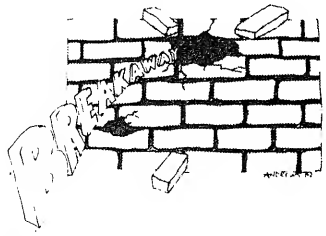

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```
50177 REM
50178 REM USER SUBROUTINES (I/Ø DRIVERS
  ) FOR 32K SYSTEM USE
50179 REM ZA%=-20480.... FOR ZI!=45056
  TO 45121 TO RELOCATE CODE
50180 ZA%=-4096
50190 FOR ZI!=61440 TO 61505
50200 READ ZI%:POKEZA%,ZI%:ZA%=ZA%+1
50210 NEXT ZI!:RETURN
```

```
50220 DATA 219,234,203,127,40,6,219,235
  ,38,0,24,2,175,103,111
50230 DATA 195,154,10,205,127,10,219,23
  4,203,119,40,250,125,211
50240 DATA 235,201,33,41,240,34,22,64,5
  5,195,51,26,219,234,203
50250 DATA 127,40,3,219,235,201,205,216
  ,67,254,27,192,33,216
50260 DATA 67,34,22,64,55,195,51,26
```

Listing 2

```
                00001 ;   **** DOWNLOADER ****
                00002 ;   USER SUBROUTINES FOR THE BASIC PROGRAM
                00003 ;   WRITTEN FOR 48K BUT RELOCATES AUTOMATICALLY
                00004 ;   BY CHANGING BASIC POKE ADDRESS START.
                00005 ;   USR0...CHECKS MODEM (UART) FOR INCOMING CHAR.
                00006 ;   USR1...SENDS OUT A CHAR PASSED TO ROUTINE.
                00007 ;   USR2...CONVERTS MODEM TO KEYBOARD TILL ANOTHER
                00008 ;         SHIFTED UPARROW IS SCANNED.
F000            00010          ORG     0F000H
F000 DBEA       00020 START    IN      A,(0EAH)          ;USR0
F002 CB7F       00030          BIT     7,A
F004 2806       00040          JR      Z,NONE
F006 DBEB       00050          IN      A,(0EBH)
F008 2600       00060 GOBACK   LD      H,0
F00A 1802       00070          JR      FINISH
F00C AF         00080 NONE     XOR     A
F00D 67         00090          LD      H,A
F00E 6F         00100 FINISH   LD      L,A
F00F C39A0A     00110          JP      0A9AH
F012 CD7F0A     00120 BEGIN    CALL    0A7FH             ;USR1
F015 DBEA       00130 WAIT     IN      A,(0EAH)
F017 CB77       00140          BIT     6,A
F019 28FA       00150          JR      Z,WAIT
F01B 7D         00160          LD      A,L
F01C D3EB       00170          OUT     (0EBH),A
F01E C9         00180          RET
F01F 2129F0     00190 SCAN     LD      HL,LOOK           ;USR2
F022 221640     00200          LD      (4016H),HL
F025 37         00210          SCF
F026 C3331A     00220          JP      1A33H
F029 DBEA       00230 LOOK     IN      A,(0EAH)
F02B CB7F       00240          BIT     7,A
F02D 2803       00250          JR      Z,NOPE
F02F DBEB       00260          IN      A,(0EBH)
F031 C9         00270          RET
F032 CDD843     00280 NOPE     CALL    43D8H
F035 FE1B       00290          CP      27                ;SHIFT UP ARROW
F037 C0         00300          RET     NZ
F038 21D843     00310          LD      HL,43D8H
F03B 221640     00320          LD      (4016H),HL
F03E 37         00330          SCF
F03F C3331A     00340          JP      1A33H
F000            00350          END     START
00000 TOTAL ERRORS
34130  TEXT AREA BYTES LEFT ■
```

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Okay, I'm sold!

Now what do I do?

All Models

Don Scarberry, Editor

In practically every computer-oriented magazine published lately, there are articles pertaining to the use of microcomputers for communication purposes. Imbedded in these articles are references to terms such as networking, teleprocessing, telecommunications, data communications and others. Many personal computer owners barely understand the basic terminology applicable to their machines and now find they have to increase their vocabulary still more in order to keep abreast of state-of-the-art capability. This article outlines the mechanics involved with getting your TRS-80 to communicate with other TRS-80s, either directly, or over the telephone lines. I call the process "Microcomputer Telecommunications"; simply put, this means using a microcomputer to communicate over a distance.

Getting Started

The very first thing you must be aware of is the fact that your TRS-80 has the capability to transmit (or receive) data to (or from) another computer. The other computer does not have to be another TRS-80. It can be an Apple™, Atari™, Commodore™ or other microcomputer. It can even be a mini or mainframe computer. You know — the kind that costs hundreds of thousands of dollars.

The process of transmitting to another computer is called uploading while downloading describes the process of receiving information. The information transmitted or received takes the form of electrical impulses that represent alphanumeric data. Actually the impulses can represent other coded data, such as Morse code, but for our intentions, I'll call the data alphanumeric. The point is, you must realize that data can be transferred from one computer to another over long distances. Of course, in order to communicate with a distant computer you're going to need one yourself. I'll assume you have chosen one of the Radio Shack models although most of what I'll be discussing will apply to other brands as well.

Practically all microcomputers have the ability to communicate with other computers, providing the appropriate equipment is available. One feature you will need, if computer-to-computer communications is to take place, is called an RS-232 interface. RS-232 is a standard communications link used between two computers which enables two-way transference of data. This is not the only method used for transferring data between two computers but it is an established standard. The RS-232 interface is standard equipment on the Model 16, Model II, Color Computer, DT-1 and Videotex terminals but you'll have to order it as an option on the Model III. Model I owners must order an RS-232 circuit board and, if you're not mechanically inclined, have it installed by a Radio Shack Computer Center. According to Radio Shack even the portable Pocket Computer PC-2 will have an RS-232 option available in the near future.

After choosing a computer with the RS-232 interface you will need additional equipment in order to establish communication with other computers. If you plan to establish a direct computer-to-computer communications network and the distance is fifty feet or less then the RS-232 connector on one computer may be directly connected to the RS-232 connector of the other through a cable with DB-25 connectors at each end. Radio Shack provides cables of various lengths for this purpose (at extra cost of course). Be aware that these cables are straight feed-through and another adapter will be necessary to properly connect the RS-232 plug of one computer to the RS-232 plug of the other. This adapter accomplishes some wire switching which is necessary for operation of direct-connect systems.

If you will be communicating with other computers via the telephone lines over long distances then you will need a modem. The modem is simply a device which converts the electrical impulses from your computer into signals which can travel down the telephone lines. The computer on the other end of the telephone line will also need a modem in order to convert these signals back into a usable form.

There are basically two types of

modems you will be concerned with: Acoustic or direct connect. An acoustic modem connects directly to the RS-232 connector on your computer. Connection to the telephone line is accomplished by placing the handset properly on the modem and then following the steps necessary for calling the other computer. An acoustic modem is somewhat less reliable than a direct-connect modem because external noise may enter the acoustic connection and interfere with the transmission or reception of data. On the other hand, a direct-connect modem connects directly to the telephone line so that the only noise that can interfere with communications is that which is already on the phone line. The direct-connect modem eliminates a source of interference inherent in an acoustic coupled system. You should make your choice of modems carefully. Solicit brochures from a number of manufacturers and compare features and cost of units that satisfy your needs.

If you use an acoustic modem you won't be concerned with telephone connectors but using a direct-connect modem requires a little knowledge in this area. The most common telephone connector currently in use is the RJ-11. This is the small female wall plug to which your phone is connected. Some older homes still have the earlier four-hole connector that is now considered obsolete. Most modems connect directly to the RJ-11 type plug, so if you have the older four-hole type you'll need to purchase a phone jack adapter which enables proper connection. Offices with multiple phone lines will usually have a different jack (RJ-24 XC). To connect to this type of jack you'll need to have the phone company do the work or purchase a special switch box. Radio Shack offers a unit (#43-233) that will enable you to connect to the RJ-24 jack and switch the computer to different telephone lines. This is a very handy device because you can then call another computer within the same office as well as those in the outside world.

What's Next

Let's assume that you've chosen a computer with RS-232 capability, selected a modem and obtained all the necessary cables and switch boxes.

At this point you still can't communicate with another computer. You will need a computer program that can transfer your communications to the RS-232 interface and down the line to the other computer. These programs are necessary before a microcomputer telecommunications network can be fully implemented. Which one should you buy? There are smart ones, dumb ones and some in between. Each is only as smart as the number of features and flexibility it contains. Again, you'll need to solicit brochures from software companies in order to make the best selection (most features for the money). The

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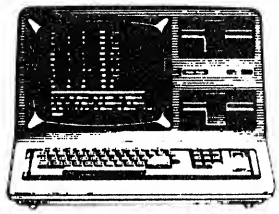

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reference chart in this issue provides itemized listings of the most important features of terminal programs currently available.

Finally, you have all the equipment necessary to start communicating with other computers. Now what? Before you actually connect the system to the phone lines you must notify the phone company of your intentions. They'll want to know what equipment you're connecting and some other pertinent information you'll discover in the operation manual which comes with the modem (and multiple phone line switch if it was used).

By this time you should really be anxious to get going with your new telecommunications system, right? You should be all prepared. Right? Wrong!

If you've recently purchased a computer you'll have to read the manuals. When you're familiar with the operation of your computer you will have to read the instruction manual for the modem. After this is digested, there's the multiple switch box manual (if used) that should be read. That done, read the instructions pertaining to operation of your terminal software package. After you've read all the necessary material involved with your system and notified the phone company, you have to connect all the equipment.

There now. Are you all hooked up? Good. You're ready to go. Right? Wrong!

Whom are You Going to Call?

Well, what would you think if you had gone through all the motions just described only to discover there was no one out there to communicate with? You would probably be a trifle upset? Don't despair. There's a whole world filled with microcomputers interfaced with modems waiting anxiously for your call.

There are literally hundreds (maybe thousands) of microcomputer owners who have established bulletin board services (BBS). These are generally available, free of charge, to anyone with proper equipment that can access them. The list of available services is practically endless and is growing daily.

Large data bases such as CompuServe, Dow Jones, The Source and many more are just a phone call away.

I realize that this article is nowhere as comprehensive as it should be, but as indicated earlier, it is intended to give an overview of what's in store for those of you who wish to enter the world of telecommunications. The first time I tried to enter this arena I quickly discovered that nowhere was there a "complete" discussion of what was needed. Nor was I aware of the huge amounts of literature that had to be waded through before actual hook-up could occur. Hopefully, the information provided here will help you gain that awareness. ■

MISOSYS MISOSYS MISOSYS

Mr. Computerhead

A 'puter game for the kids

Model I, PMC-80, LNW80

Kenneth Gibbs, Highspire, PA

If you've ever had to refuse the request of a toddler to play with the 'puter, this program will improve your image with the youngsters.

Almost all programs are too complicated or too easily stopped to be safe for use by young children.

Mister Computerhead is simple enough for the smallest child to use. It is impossible to do anything that breaks up the program without reaching around to the back of the CPU and pressing the reset or on/off buttons.

Mister Computerhead is similar to the well known Mr. Potatohead game which children have loved for years. By pressing the number keys one through five, one of five different parts of Mister Computerhead's face will change.

Nothing happens if any of the other keys are pressed. The BREAK key has been disabled in line 10. To list the program after running, you must press the reset button, then LIST.

The listing is relatively short — 4849 bytes. You will note that 8000 bytes have been cleared for string space. This figure admittedly falls into the category of overkill. But, there is a distinct relation between the number of bytes cleared and how rapidly the face changes. Please resist the temptation to clear less string space.

I have tried to avoid placing spaces between quotation marks because I know how difficult it is to enter a program from a listing and tell how many spaces there are. Instead, I have made extensive use of the CHR$ space compression codes. If more programmers would do this it would make things easier for all the people who like to enter programs from listings.

There are 9000 different faces possible in the program, ranging from devils, to pirates, to clowns.

So, here's one for the little folks to call their own. Don't be surprised if you find yourself toying with Mister Computerhead.

Program Listing for Mr. Computerhead

```
1Ø POKE16396,23
2Ø CLS:CLEAR8ØØØ:DEFSTRA-X:DEFINTY,Z:PR
INTCHR$(23)
3Ø PRINT@522,"MISTER COMPUTERHEAD"
4Ø A=CHR$(129):B=CHR$(24):C=CHR$(26):D=
CHR$(132):E=CHR$(133):F=CHR$(136):G=CHR
$(138):H=CHR$(14Ø):I=CHR$(143):J=CHR$(1
44):K=CHR$(145):L=CHR$(148):M=CHR$(149)
:N=CHR$(16Ø):O=CHR$(162):P=CHR$(168):Q=
CHR$(17Ø):R=CHR$(176)
5Ø S=CHR$(32):T=CHR$(179):U=CHR$(188):V
=CHR$(191):W=CHR$(13Ø):X=CHR$(131):FA=V
+CHR$(2Ø3)+V+C+STRING$(13,B)
6Ø HE=FA+FA+FA+FA+FA+FA+FA+I+U+R+CHR$(1
99)+R+U+I+STRING$(11,B)+C+X+V+STRING$(5
,U)+V+X
7Ø FORZ=1TO25ØØ:NEXT
8Ø PRINT@522,CHR$(211):PRINT@348,HE;
9Ø PRINT@982,"MISTER COMPUTERHEAD";
1ØØ PRINT@Ø,"PRESS":PRINT"THIS":PRINT"K
EY":PRINT" ";CHR$(92);
11Ø PRINT@32Ø,"<1> HAIR";:PRINT@448,"<2
> EYES";:PRINT@576,"<3> NOSE";:PRINT@7Ø
4,"<4> EARS";:PRINT@832,"<5> MOUTH";
12Ø Y1=Ø:Y2=Ø:Y3=Ø:Y4=Ø:Y5=Ø
13Ø IN=INKEY$
14Ø IFIN=""THEN13Ø
15Ø IFIN="1"GOSUB21Ø
16Ø IFIN="2"GOSUB4ØØ
17Ø IFIN="3"GOSUB53Ø
18Ø IFIN="4"GOSUB66Ø
19Ø IFIN="5"GOSUB8ØØ
2ØØ GOTO13Ø
21Ø Y1=Y1+1:IFY1=9THENY1=1
22Ø ONY1GOSUB23Ø,25Ø,27Ø,37Ø,31Ø,33Ø,35
Ø,29Ø:RETURN
23Ø HA=C+C+C+CHR$(197)+R+STRING$(7,U)+R
+C+STRING$(11,B)+U+I+X+CHR$(199)+X+I+U
24Ø GOSUB39Ø:RETURN
25Ø HA=C+CHR$(197)+"VVVV"+S+"VVVV"+C+ST
RING$(12,B)+STRING$(15,"V")+C+STRING$(1
```

```
6,B)+"VVV"+U+I+I+V+"VVV"+V+I+I+U+"VVV"+
C+STRING$(16,B)+"V"+V+X+S+S+X+V+R+V+X+S
+S+X+V+"V"
260 GOSUB390:RETURN
270 HA=C+C+C+S+S+S+"!!!!!!!!!!!!!!!"+C+ST
RING$(13,B)+V+STRING$(11,I)+V
280 GOSUB390:RETURN
290 HA=C+S+S+S+S+S+"???? ? ????"+C+STRING
$(15,B)+S+S+S+"????????????????"+STRING$(1
4,B)+C+"????????????????"+STRING$(16,B)+
C+"??"+U+STRING$(11,I)+U+"??"
300 GOSUB390:RETURN
310 HA=CHR$(200)+R+U+R+STRING$(6,B)+C+R
+U+STRING$(5,V)+U+R+C+STRING$(11,B)+P+U
+STRING$(9,V)+U+L+C+STRING$(13,B)+STRIN
G$(5,V)+I+I+I+STRING$(5,V)+C+STRING$(13
,B)+Q+V+I+X+CHR$(197)+X+I+V+M
320 GOSUB390:RETURN
330 HA=S+S+S+M+CHR$(203)+Q+C+STRING$(14
,B)+Q+V+J+CHR$(201)+N+V+M+C+STRING$(15,
B)+V+V+V+J+S+S+R+U+R+S+S+N+V+V+V+C+STRI
NG$(15,B)+Q+V+V+V+U+STRING$(5,V)+U+V+V+
V+M+C+STRING$(14,B)+V+I+X+CHR$(199)+X+I
+V
340 GOSUB390:RETURN
350 HA=C+C+S+S+S+STRING$(13,V)+C+STRING
$(13,B)+STRING$(13,V)+C+STRING$(18,B)+S
TRING$(5,R)+CHR$(181)+STRING$(11,R)+CHR
$(186)+STRING$(5,R)
360 GOSUB390:RETURN
370 HA=C+S+S+S+S+N+CHR$(190)+STRING$(7,
V)+CHR$(189)+J+C+STRING$(12,B)+P+STRING
$(11,V)+L+C+STRING$(13,B)+STRING$(13,V)
+C+STRING$(16,B)+R+R+R+STRING$(13,V)+R+
R+R
380 GOSUB390:RETURN
390 PRINT@22,CHR$(211);:PRINT@86,CHR$(2
11);:PRINT@150,CHR$(211);:PRINT@214,CHR
$(211);:PRINT@274,CHR$(215);:PRINT@22,H
A;:RETURN
400 Y2=Y2+1:IFY2=6THENY2=1
410 ONY2GOSUB420,440,460,480,500:RETURN
420 EY=N+H+H+H+J+S+N+H+H+H+J+C+STRING$(
9,B)+U+CHR$(197)+U
430 GOSUB520:RETURN
440 EY=CHR$(172)+H+H+H+CHR$(172)+R+CHR$
(156)+H+H+H+CHR$(156)+C+STRING$(11,B)+Q
+" @"+N+CHR$(158)+X+CHR$(173)+J+"@ "+M+
C+B+B+B+B+CHR$(139)+H+CHR$(142)+A+STRIN
G$(11,B)+W+CHR$(141)+H+CHR$(135)
```


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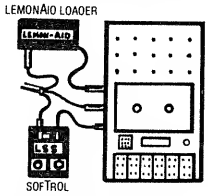

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```
450 GOSUB520:RETURN
460 EY=R+R+R+U+U+H+H+CHR$(167)+T+T+CHR$
(147)+C+STRING$(11,B)+CHR$(171)+V+V+V+C
HR$(135)+S+F+CHR$(135)+R+J+C+B+B+CHR$(1
41)+E+STRING$(10,B)+W+CHR$(175)+V+CHR$(
159)
470 GOSUB520:RETURN
480 EY=S+R+CHR$(180)+J+S+S+S+N+CHR$(184
)+R+C+STRING$(10,B)+G+CHR$(161)+CHR$(18
0)+CHR$(139)+S+S+S+CHR$(135)+CHR$(184)+
CHR$(146)+E+C+B+B+B+B+W+CHR$(173)+CHR$(
135)+STRING$(9,B)+CHR$(139)+CHR$(158)+A
490 GOSUB520:RETURN
500 EY=F+CHR$(172)+R+CHR$(197)+R+CHR$(1
56)+D+C+STRING$(9,B)+W+CHR$(139)+S+S+S+
CHR$(135)+A+C+B+U+STRING$(7,B)+U
510 GOSUB520:RETURN
520 PRINT@350,CHR$(203);:PRINT@414,CHR$
(203);:PRINT@478,CHR$(196);:PRINT@492,C
HR$(196);:PRINT@350,EY;:RETURN
530 Y3=Y3+1:IFY3=6THENY3=1
540 ONY3GOSUB550,570,590,610,630:RETURN
550 NO=S+U+C+B+B+B+R+U+V+U+R+C+B+B+B+B+
B+I+"O"+I+"O"+I
560 GOSUB650:RETURN
570 NO=N+U+J+C+B+B+B+B+P+V+V+V+L+C+STRI
NG$(6,B)+P+V+I+V+I+V+L
580 GOSUB650:RETURN
590 NO=N+R+J+C+B+B+B+V+V+V+C+B+B+B+W+X+
A
600 GOSUB650:RETURN
610 NO=C+B+P+U+V+U+L+C+STRING$(5,B)+I+V
+V+V+I
620 GOSUB650:RETURN
630 NO=S+R+C+B+B+Q+V+M+C+B+B+B+B+P+I+V+
I+L
640 GOSUB650:RETURN
650 PRINT@486,CHR$(195);:PRINT@546,CHR$
(199);:PRINT@610,CHR$(199);:PRINT@486,N
O;:RETURN
660 Y4=Y4+1:IFY4=6THENY4=1
670 ONY4GOSUB680,700,720,740,760:RETURN
680 LE=C+S+S+N+V+C+B+B+Q+M+C+B+V+C+B+W:
RE=C+V+J+C+B+B+Q+M+C+B+B+V+C+B+A
690 GOSUB780:RETURN
700 LE=S+N+R+C+B+B+B+P+CHR$(135)+X+I+C+
B+B+B+B+G+CHR$(180)+"("+C+B+B+G+CHR$(18
0)+C+B+W+CHR$(141):RE=S+R+J+C+B+B+B+I+X
+CHR$(139)+L+C+B+B+B+")"+CHR$(184)+E+C+
B+B+B+CHR$(184)+E+C+B+B+B+CHR$(142)+A
710 GOSUB780:RETURN
720 LE=S+S+S+P+C+B+B+N+V+C+B+B+Q+C+B+W+
V+C+B+G:RE=L+C+B+V+J+C+B+M+C+B+B+V+A+C+
B+B+E
730 GOSUB780:RETURN
740 LE=L+C+B+CHR$(175)+U+R+C+B+B+V+V+CH
R$(175)+C+B+B+B+G+V+CHR$(180)+C+B+I:RE=
S+S+S+P+C+B+B+B+R+U+CHR$(159)+C+STRING$
(4,B)+CHR$(159)+V+V+C+B+B+B+CHR$(184)+V
+E+C+B+B+B+I
750 GOSUB780:RETURN
760 LE=S+S+N+J+C+B+B+B+P+V+I+C+B+B+V+R+
C+B+B+B+G+V+S+C+B+B+W+I:RE=N+J+C+B+B+I+
V+L+C+B+B+B+R+V+C+B+B+S+V+E+C+B+B+B+I+A
770 GOSUB780:RETURN
780 PRINT@340,CHR$(196);:PRINT@374,CHR$
(196);:PRINT@404,CHR$(196);:PRINT@438,C
HR$(196);:PRINT@468,CHR$(196);:PRINT@50
2,CHR$(196);:PRINT@532,CHR$(196);:PRINT
@566,CHR$(196);:PRINT@596,CHR$(196);:PR
INT@630,CHR$(196);
790 PRINT@340,LE;:PRINT@374,RE;:RETURN
800 Y5=Y5+1:IFY5=10THENY5=1
810 ONY5GOSUB820,840,860,880,900,920,94
0,960,980:RETURN
820 MO="<"+U+R+CHR$(197)+R+U+">"+C+STRI
NG$(9,B)+I+V+X+X+X+V+I+C+STRING$(6,B)+W
+X+I+X+A
830 GOSUB1000:RETURN
840 MO=S+S+N+U+STRING$(3,H)+U+J+C+STRIN
G$(7,B)+V+"UUUUU"+V+C+STRING$(7,B)+W+ST
RING$(5,X)+A
850 GOSUB1000:RETURN
860 MO=CHR$(196)+R+U+R+C+STRING$(4,B)+Q
+V+S+V+M+C+STRING$(4,B)+X+I+X
870 GOSUB1000:RETURN
880 MO=S+S+N+CHR$(184)+CHR$(172)+S+CHR$
(156)+CHR$(180)+J+C+STRING$(8,B)+CHR$(1
42)+X+R+U+H+U+R+X+CHR$(141)+C+STRING$(6
,B)+X+I+X
890 GOSUB1000:RETURN
900 MO="<"+CHR$(180)+CHR$(199)+CHR$(184
)+">"+C+STRING$(10,B)+W+CHR$(175)+U+R+R
+R+U+CHR$(159)+A+C+STRING$(7,B)+CHR$(13
9)+I+I+I+CHR$(135)
910 GOSUB1000:RETURN
920 MO=F+U+STRING$(7,R)+U+D+C+STRING$(1
0,B)+CHR$(181)+"UUUUUUU"+CHR$(186)+C+ST
RING$(8,B)+STRING$(7,X)
930 GOSUB1000:RETURN
940 MO=S+N+R+R+J+S+N+R+R+J+C+STRING$(8,
B)+X+"V"+I+I+I+"V"+X
950 GOSUB1000:RETURN
960 MO=S+S+S+S+R+R+R+C+STRING$(4,B)+U+M
+S+Q+U+C+STRING$(6,B)+G+E+S+S+S+G+E
970 GOSUB1000:RETURN
980 MO=S+U+R+CHR$(197)+R+U+C+STRING$(8,
B)+I+CHR$(189)+CHR$(135)+X+CHR$(139)+CH
R$(190)+I+C+STRING$(6,B)+G+CHR$(180)+R+
CHR$(184)+E
990 GOSUB1000:RETURN
1000 PRINT@670,CHR$(203);:PRINT@734,CHR
$(203);:PRINT@802,CHR$(199);:PRINT@670,
MO;:RETURN ■
```

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Write your own communications program

How to do it yourself

Models I/II/III, PMC-80, LNW80

Patrick Morgan, Los Angeles, CA

If you have a computer, and haven't tried on-line communications, I think you should consider it. It is a chance to ask technical questions, share programs, and have a lot of fun. There are several hundred computer bulletin boards all over the country, and in foreign countries as well. You can also sign-on to two big systems, CompuServe and The Source, which will supply more data than you could ever use. All you need is a little hardware, software, and a telephone.

There are numerous communications software programs around, from simple $29 ones, to the $200 packages that do almost everything. This program is very simple, but it is the start of your customized program. Just add the features you need, and you will match the big boys. This article is intended to give you all of the information you will need to get started.

Hardware

Only two pieces of hardware are needed: an RS-232 board, and a modem. Some manufacturers put these in the same package. The RS-232 board takes eight-bit parallel data and converts it into a stream of eight bits, one after the other, and at the proper rate. The modem (MODulator-DEModulator) transforms these bits into tones which can be sent over the phone line.

The process is reversed to receive data. The term RS-232 is a standard which defines the use and voltage levels on the twenty-five-pin output cable. The details are readily available and won't be discussed here. Your total cost for these items will be about $250.

RS-232 Software

Forget about writing a program in BASIC. It is just too slow. An assembly language program is the most straightforward and is not too difficult. FORTRAN, Pascal, or compiled BASIC will also work.

The following discussion refers to the Radio Shack Model I RS-232 board (#26-1145). Other boards or equipment will be similar. The board is not memory mapped, but uses four ports; E8H, E9H, EAH and EBH (in decimal, they are 232, 233, 234, and 235).

The first port (E8H) is the master reset, which is only used once, and the modem status registers, which are not needed at all.

An IN command to the second port reads the DIP switches on the RS-232 board. It is best to ignore these and set your own characteristics by software as shown below. An OUT to the second port sets the incoming and outgoing baud rate. The board can be set from 50- to 19200-baud, and the transmit and receive rates can be set independently. The low order nibble (bits zero to three) sets the receive rate. The high nibble sets the transmit rate. You want 300-baud for both.

A table, which comes with the board, says to use 5 for 300-baud. The steps to do this are:

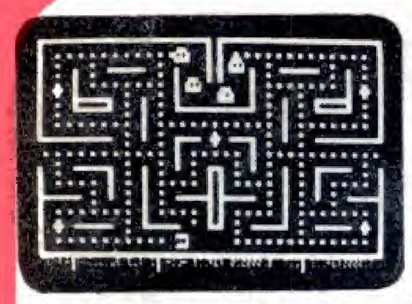
```
LD   A,55H      ;load accumulator
OUT (0E9H),A    output to port
```

The third port (EAH) is the control register and is confusing. The port is divided by bits, with different bits controlling different functions. Ninety-nine percent of the time, the setup you want is seven-bit word length, one stop bit, and even parity. The byte you want to load is A5H (or 10100101, if you are checking the function table). If you are sending graphics, you will need an eight-bit word length, and will want to load E5H into this port. This is set once, at the beginning of your program.

The IN port of EAH is the buffer status register. This register is checked before every input or output operation. If the status isn't right, go do something else and check again later. Bit seven is set equal to one if anything was received from the line. Bit six is set when the transmit buffer is ready for a character to be sent. Remember that these characters are being sent and received at 300 bits per second, which is very slow for a computer. You do have time to run a short subroutine between letters. You can also check bit four to see if you have a parity error. This is seldom done, however. Bits five and six check for framing and overflow errors. I don't know of any program that checks for these.

The last port (EBH) is the register for data that is transmitted or received. If you want to send a letter, first check bit 6 of port EA. If this is not zero, load your character into port EB. That's it. All of the housekeeping is done by the UART chip (Universal Asynchronous Receive and Transmit). It sends a start bit, then takes the byte you loaded into port EB and sends out one bit at a time, at the correct rate, and finishes by sending a stop bit. The receive process is just the reverse.

All photos are actual TRS-80 screens.



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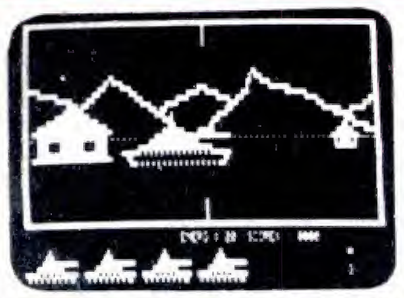
This incredibly popular game craze now runs on your TRS-80! It's eat or be eaten. You run Scrarfman around the maze, gobbling up everything in your path. Try to eat it all before nasty monsters devour you. Excellent high speed machine language action game from the Cornsoft Group. With sound. Price: A

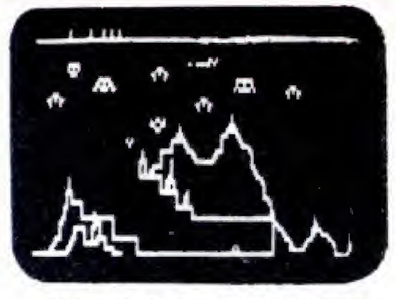


ARMORED PATROL

A realistic tank battle simulation. Your view is a 3--D perspective of an alien landscape. Maneuver your T-36 tank to locate and destroy enemy tanks and robots that lay hidden, ready to assault you. Clever graphics create the illusion of movement and dimension. From Adventure International. With sound. Price: B

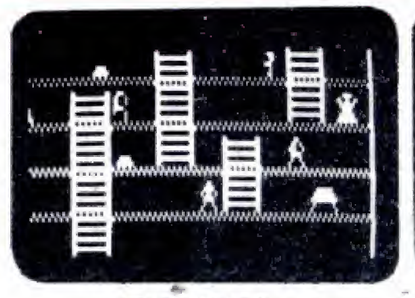
REAR GUARD

Deadly waves of enemy Cyborg craft attack your fleet from the rear. You are the Mothership's sole defender. You have unlimited firepower but the Cyborgs are swift, nimble attackers. Your abilities are tested hard in this game or lightening fast action and lively sound from Adventure International. Price: B



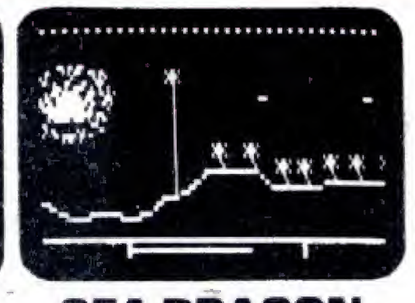
STRIKE FORCE

As the primary defender of a world of cities under deadly alien attack, your weaponry is the latest: rapid fire missiles, long range radar, and incendiary "star shells." Your force field can absorb only a limited number of impacts. A complex game of strategy, skill and reflexes from Melbourne House. Price: A



PANIK

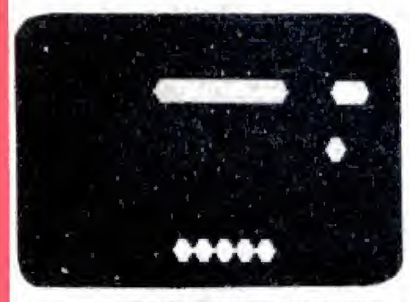
Trapped at an enemy building site, your fate seems certain. Your laser is empty and evil Mzors are closing in. You'll have to climb ladders and think one step ahead of the various monsters. A challenging game for agile minds. From Fantastic Software with voice (Disk has larger vocabulary). Price: B



SEA DRAGON

Your submarine, the U.S.S. Sea Dragon, penetrates a mined enemy channel. Armed with missiles and torpedos, you engage the enemy while navigating unknown waters. Succeed or come to a salty end in this game. 29 screens of horizontally scrolling sea-scrape and sound from Adventure International. Price: B

SAVE 10, 15, 20%

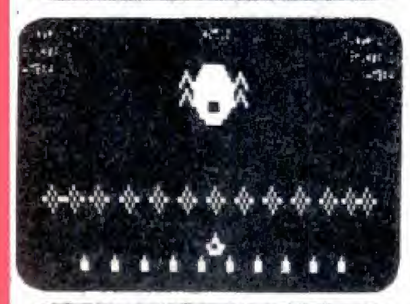


BOUNCEOIDS

Huge boulders careen off the walls. You're in the middle, in danger of being flattened. Keep your wits about you as you blast these "bounceoids" from the screen. Large ones break into many small ones. Clear a screen, and enter a fast-paced challenge stage with a chance for big bonus points. From the Cornsoft Group. Price: A

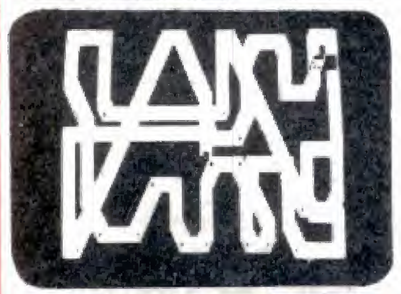
CATERPILLAR

An arcade favorite! Stop these multi-sectioned crawlers before they creep down through the mushrooms. Zap one and it splits into two smaller bugs, each with its own sense of direction. There are moths and tumble bugs too. It all adds up to lots of fun for kids and adults alike. From Soft Sector Marketing. With sound. Price code: A



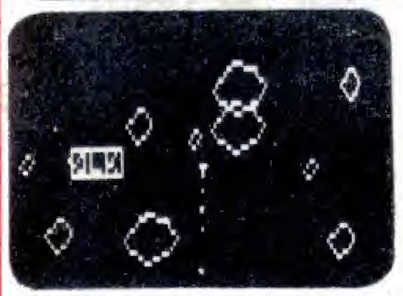
DEFENSE COMMAND

The invaders are back! Alone, you defend the all important nuclear fuel canisters from the repeated attacks of thieving aliens, repeatedly. An alien passes your guard, snatches a canister and flys straight off. Quick! You have one last chance to blast him from the sky! With sound and voice. Price: A



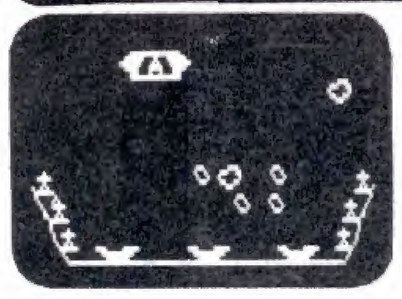
CRAZY PAINTER

You have to paint the floor white. We give you the paint and brush. Sounds easy? Hah! You'll be confounded by stray dogs, snakes, sloshing buckets of turpentine, even a ravenous "paint eater." A crazy, imaginative new game with ten selectable levels of skill for new or seasoned game players. Lot's of laughs. Price: A .



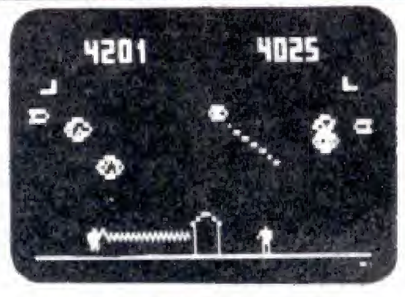
SUPER NOVA

Asteroids float ominously around the screen. You must destroy the asteroids before they destroy you! (Big asteroids break into little ones). Your ship will respond to thrust, rotate, hyperspace and fire. Watch out for that saucer with the laser! As reviewed in May 1981 Byte Magazine. Price: A



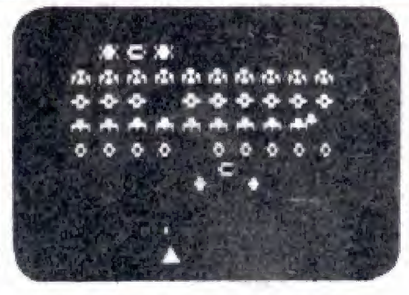
METEOR MISSION II

As you look down on your view, astronauts cry out for rescue. You must maneuver through the asteroids and meteors. (Can you get back to the space station?) Fire lasers to destroy the asteroids, but watch out, there could be an alien Flagship lurking Includes sound effects! Price: A



OUTHOUSE

You are the mighty protector of this small (but important) wooden structure. For reasons unknown, a bizarre gang of miscreants wish to vandalize, loot and otherwise destroy the little "half moon house." Your patrol craft has lasers and smart bombs to deal with this terror. From SSM with sound. Price: A

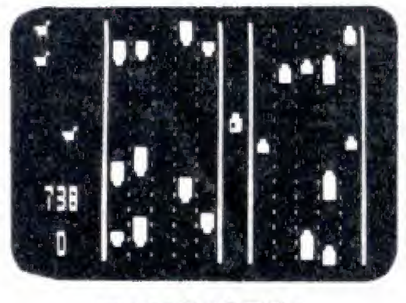


GALAXY INVASION

The sound of the klaxon is calling you! Invaders have been spotted warping toward Earth. You shift right and left as you fire your lasers. A few break formation and fly straight at you! You place your finger on the fire button knowing that this shot must connect! With sound effects! Price: A

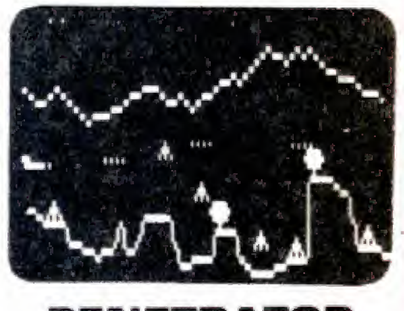
LASER DEFENSE

In this game of ICBM's, high-energy lasers and particle beams, you control the U.S. strategic defense satellite system. From your viewpoint high above the globe, you intercept Soviet nuclear missiles in flight and attempt to destroy their scattered missile silos. With sound from MED Systems. Price: B



CHICKEN

Will the chicken cross the road? That's up to you. Can you guide these helpless little chicks across the perilous 10 lane super highway to safety? Or will you bumble, littering the blacktop with a storm of chicken feathers? A humourous yet challenging game of nerves from SSM with sound. Price: A



PENETRATOR

Soar swiftly over jagged landscape, swooping high and low to avoid obstacles and enemy missiles attacks. With miles of wild terrain and tunnels to penetrate, you're well armed with bombs and multiple forward missile capability. From Melbourne House. Features sound, trainer mode and customizing program. Price: C

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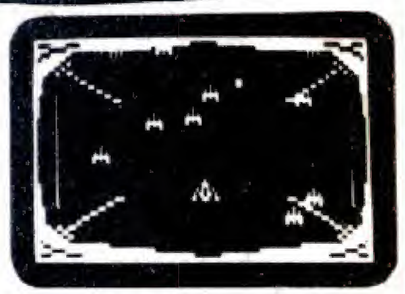
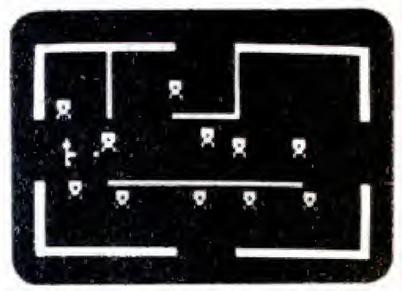
TOP TEN

1. SCARFMAN - *All time favorite*
2. ARMORED PATROL - *Super 3D graphics*
3. PENETRATOR - *Rave reviews*
4. STELLAR ESCORT - *Fast and Challenging*
5. CRAZY PAINTER - *Unique game concept*
6. PANIK - *Remarkable Voices*
7. DEFENSE COMMAND - *Tough struggle*
8. CATERPILLAR - *Good rendition*
9. ROBOT ATTACK - *With voice*
10. SEA DRAGON - *Amazing "Seascape"*



STELLAR ESCORT

The latest super action game from Big Five. As the Federation's top space fighter you've been chosen to escort what is possibly the most important shipment in Federation history. The enemy will send many squadrons of their best fighters to intercept. With sound. Disk version has voices. Price: A



ROBOT ATTACK

Talks without a voice synthesizer, through the cassette port. With just a hand laser in a remote space station, you encounter armed robots. Some march towards you, more wait around corners. Careful, the walls are electrified. Zap as many robots as you dare before escaping to a new section. More robots await you. Price: A

LUNAR LANDER

As a vast panoramic moonscape scrolls by, select one of many landing sights. The more perilous the spot, the more points scored -- if you land safely. You control LEM main engines and side thrusters. One of the best uses of TRS-80 graphics we have ever seen. From Adventure International. With sound. Price: A

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All photos are actual TRS-80 screens.

The real meat of a communication program is a loop that checks for an incoming character, displays it, and then checks the keyboard to see if anything is to be sent. To this simple loop, you add all the bells and whistles you want.

Program Details

I only used a few ROM routines. The first is 002BH, which scans the keyboard and returns, to the accumulator, the ASCII value of any key pressed. A call to 0049H will continuously call 002BH until a key is pressed. A call to 0033H will put any value in the accumulator on the screen. It also takes care of line length and scrolling.

Take a look at Listing 1. Lines 70 through 100 are the initialization. Lines 130 through 390 are the input-output loop, which is the heart of the system. The send subroutine is separate so that it can be called by other functions. This is the minimum program and is all you need to call most bulletin boards. Type in and assemble this much, then call a bulletin board and give it a try.

Control Keys

Most computer keyboards have a key marked control which, when pushed in combination with other letters, will produce special functions. The control codes are the ASCII codes between 00 and 1FH. See Table 1 for a complete ASCII list. Only a few of them are normally used. They are usually identified by their associated letter (control C, control H, etc.), rather than by their function.

Control H is a backspace (same as the left arrow). Control C is used by CompuServe to interrupt a message. Control E and F are used by many printers to change between regular and expanded print. Control W will change the video to thirty-two character per line mode. (You can't get out of it easily.) Control M is carriage return. When these are sent, they control the function on the distant computer.

The control code is 40H (64 decimal) less than its associated letter. Letter A is ASCII 41H, control A is 01H, B is 42H, control B is 02H, and so on. The TRS-80 Model I doesn't have this control key, so we'll have to improvise. You could use shift downarrow and the letter, but this is rather sloppy. I decided to use the clear key as the control key. Line 310 looks for this key, and if found, subtracts 40H from the next letter hit and returns. I used, in sequence, the control key, then the letter, to avoid awkward reaches.

Printer

If you have a printer, you will want to add a driver as indicated on line 410. When you are receiving a message from a distant computer, you may only get one chance to read it. A printer will save it for you. If your printer is slower than thirty characters per second, you will have to write a buffer or spooler routine. That distant computer might not wait for you.

Those of you with a serial printer have a problem. Both Models I and III have only one serial port, and it is used for the modem. Some modems with a built-in RS-232 port use a different set of ports which allow you to use Radio Shack's board for the printer.

Half and Full Duplex

The terms half and full duplex are confusing when used with low-speed networks or bulletin boards because the terms are not used in the normal sense. A 300-baud modem of the Bell 103 type is always in full duplex mode. Two tones are used to transmit, and two different tones are used to receive. You can send and

Table 1
ASCII Character Codes in Standard Format

Second hexadecimal digit	First hexadecimal digit 0	1	2	3	4	5	6	7
0	NUL	DLE	SP	0	@	P	`	p
1	SDH	DC1	!	1	A	Q	a	q
2	STX	DC2	"	2	B	R	b	r
3	ETX	DC3	#	3	C	S	c	s
4	EOT	DC4	$	4	D	T	d	t
5	ENQ	NAK	%	5	E	U	e	u
6	ACK	SYN	&	6	F	V	f	v
7	BEL	ETB	'	7	G	W	g	w
8	8S	CAN	(	8	H	X	h	x
9	HT	EM	)	9	I	Y	i	y
A	LF	SUB	*	:	J	Z	j	z
B	VT	ESC	+	;	K	[	k	{
C	FF	FS	,	<	L	\	l	|
D	CR	GS	-	=	M	]	m	}
E	SD	RS	.	>	N	^	n	~
F	SI	US	/	?	O	_	o	DEL

27: Apostrophe or acute accent
2C: Comma
2D: Hyphen
5F: Underline
6D: Grave accent

Program Listing for Communications Program

```
                00010 ; >> COMMUNICATIONS TERMINAL SOFTWARE <<
                00020 ;
7000            00030           ORG     7000H   ;START LOC.
002B            00040 KBD       EQU     2BH
0033            00050 VID       EQU     33H
7000            00060 START     EQU     $
7000 D3E8       00070           OUT     (0E8H),A        ;RESET RS232
7002 3E55       00080           LD      A,55H           ;SET BAUD RATE
7004 D3E9       00090           OUT     (0E9H),A        ;AT 300
7006 3EA5       00100           LD      A,0A5H          ;A5=10100101
                00110 ; A5=7 BIT WORD, EVEN PARITY, 1 STOP BIT
                00120 ;
7008 CD1070     00130 LOOP      CALL    INPUT
700B CD2370     00140           CALL    OUTPUT
700E 18F8       00150           JR      LOOP
                00160 ;
7010 DBEA       00170 INPUT     IN      A,(0EAH)        ;ANYTHING REC'D?
7012 CB7F       00180           BIT     7,A             ;CHECK BIT 7
7014 C8         00190           RET     Z               ;RETURN IF NOTHING
7015 DBEB       00200           IN      A,(0EBH)        ;LOAD BYTE
7017 28F7       00210           JR      Z,INPUT
7019 F5         00220           PUSH    AF              ;SAVE CHARACTER
701A CD3770     00230           CALL    PRINT           ;TO LINE PRINTER
701D F1         00240           POP     AF
701E CD3300     00250           CALL    VID             ;SHOW ON SCREEN
7021 18ED       00260           JR      INPUT           ;GET ANOTHER
                00270 ;
7023 CD2B00     00280 OUTPUT    CALL    KBD             ;SCAN KEYBOARD
7026 B7         00290           OR      A               ;SET FLAG
7027 C8         00300           RET     Z               ;IF NO KEY PUSHED
```

receive at the same time. Most networks will echo the character you send. Look at the listing again, and ask how the letter got from the keyboard to the CRT. If this letter is not echoed, you are considered to be in half duplex mode.

Frills

Now, the fun starts! You have the elementary program working just fine and want some special features. Most are too long to describe here, but they aren't very hard if you think about it.

Add a lowercase driver. How about an auto log-on? Just write your name, password, etc., in a string and send it with one command. Add a buffer so that you can type off-line and send a message later at full speed. When you really feel like a challenge, write a disk routine so that you can upload and download programs. As you use the system, you will think up more features to add.

```
7028 FE1F     00310          CP      1FH          ;<CLEAR> IS CONTROL KEY
702A 280C     00320          JR      Z,CTRL
702C F5       00330 SEND     PUSH    AF           ;SAVE CHARACTER
702D DBEA     00340          IN      A,(0EAH)     ;UART READY?
702F CB77     00350          BIT     6,A          ;CHECK BIT 6
7031 28FA     00360          JR      Z,SEND+1     ;LOOP UNTIL READY
7033 F1       00370          POP     AF
7034 D3EB     00380          OUT     (0EBH),A     ;SEND BYTE
7036 C9       00390          RET
              00400 ;
7037 C9       00410 PRINT    RET     ; -- PRINTER DRIVER GOES HERE --
              00420 ;
7038 CD4900   00430 CTRL     CALL    049H         ;KEYBOARD SCAN
703B FE41     00440          CP      'A'          ;ALLOW VALUES FOR
703D F8       00450          RET     M            ;  ASCII A-Z ONLY
703E FE5A     00460          CP      'Z'
7040 F0       00470          RET     P            ;RETURN OTHERWISE
7041 D640     00480          SUB     40H          ;CONVERT TO CONTROL
7043 C32C70   00490          JP      SEND         ;LOAD UART
              00500
7000          00510          END     START
00000 TOTAL ERRORS

CTRL    7038 00430   00320
INPUT   7010 00170   00130 00210 00260
KBD     002B 00040   00280
LOOP    7008 00130   00150
OUTPUT  7023 00280   00140
PRINT   7037 00410   00230
SEND    702C 00330   00360 00490
START   7000 00060   00510
VID     0033 00050   00250 ■
```


MOD I/III SPEED MOD

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SCRIPLUS v3.0 (by ROSTEK) is the software "patch" for SCRIPSIT (c) that lets you output control codes to CHANGE TYPE STYLES, UNDERLINE, etc. from within your text files. Written especially for the MX-80 but works fine with most any printer that accepts control codes. Makes your printer do all the tricks it was designed for. +DIR, KILL, MERGE, and MORE, WHILE IN SCRIPSIT (c).

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All Models

George Kwascha, Charlotte, NC

The Hayes Smartmodem is designed to be used with a RS-232 compatible computer, in either full- or half-duplex modes, from zero- to 300-baud. It will not operate through the cassette port plug as do some less expensive models on the market. Commands may be entered by keyboard or under program control. The smartmodem has full capability to dial automatically and to answer incoming calls automatically. Touch-Tone and pulse dialing or a combination of the two is possible. An audio speaker monitor permits the user to hear the dialing in progress. The Hayes Smartmodem is "smartly" packaged in a small-sized (1½" x 5½" x 9½") stackable unit. A power pack (AC adaptor) and telephone cable with modular jack (RJ11) on either end are also included.

Owner's Manual

The owner's manual is one of the best I've ever seen. It is written in plain English, with step-by-step examples that will get you off and running with your smartmodem. The manual includes a section that covers background history and the basics of telephone communications. It defines and explains such terms as baud rate, modem, full- and half-duplex, pulse and Touch-Tone dialing. The manual is about the size of a paperback with a spiral binding, sturdy cover and high-quality glossy pages. It even includes a tear-out Quick Reference Card in the back.

Installation

Before connecting the smartmodem, you should notify Ma Bell of your intentions. The telephone company records the FCC Registration Number and Ringer Equivalence of the modem. These numbers can be found at the bottom of the unit. For those who are wondering, there is no charge levied for the connection.

Installation is relatively simple. All connections are made in the rear of the unit. The phone cable, RS-232 connector (DB-25) and 13-volt power cord are plugged into their respective jacks. On the rear panel you will also find an on-off switch and volume control for the audio monitor. I recommend plugging the power pack into an outlet that is controlled by a wall switch. This will allow you to turn off power to the power pack even when the modem is turned off.

Part of the installation procedure involves the setting of eight configuration switches behind the front panel. The front panel is easily removed with a small screwdriver. A DIP switch containing eight configuration switches can be seen. The function of each switch position is outlined briefly below.

Switch 1, Down: enables modem to execute commands from terminal if computer does not support RS-232 DTR lead, pin 20.

— Up: same as above, except computer supports DTR lead.

Switch 2, Down: modem responds to commands with non-verbose (digits) result codes.

— Up: modem responds to commands with verbose (words) result codes.

Switch 3, Down: result codes sent to computer.

— Up: no result codes sent.

Switch 4, Down: modem will not echo characters back to screen, unless in half-duplex.

— Up: modem will echo characters to screen.

Switch 5, Down: modem will not answer phone automatically.

— Up: modem will answer phone automatically.

Switch 6, Down: allows computer to accept echoed characters and result codes from modem.

— Up: allows computer to sense if carrier signal is coming from another modem.

Switch 7, Down: for multi-line connection.

— Up: for single-line connection.

Switch 8, Down: not used.

These switches come factory pre-set, but should be checked to meet your particular needs.

Operation

The front panel has seven LED indicators. These lights denote the status of your modem at any particular moment in time. From left to right, they are labeled as follows:

AA — Automatic Answer: if illuminated the modem will answer your telephone.

CD — Carrier Detect: if illuminated it indicates that the modem

has detected a signal from another modem.

OH — Off Hook: indicates when the modem has picked up your phone.

RD — Receive Data: indicates data is being received.

SD — Send Data: indicates data is being transmitted.

TR — Terminal Ready: terminal is ready to receive commands.

MR — Modem Ready: indicates when the modem is turned on.

The Hayes Smartmodem has two functional states. The on-line state serves the purpose of communicating via telephone lines to another modem. The on-line state is automatically activated after a call is answered or a connection is made after dialing. The local command state allows the smartmodem to analyze and execute commands that it receives from the user. After receiving a command the smartmodem will respond (if switch 3 is down) with a result code that lets you know if your command was accepted or rejected. These result codes will be expressed as words if Switch 2 is up or as digits if Switch 2 is down. These codes are explained in the manual.

In the command state, instructions can be given to dial telephone numbers, answer telephone calls, control the speaker monitor, change duplex mode, pickup or hangup the phone receiver, and change numerous operating parameters of the modem.

To illustrate the ease with which this is done, let's dial a telephone number. In the command state, simply type AT D568-1381 and hit ENTER (or return). The modem proceeds to pickup the receiver and dial the number. All this can be heard through the audio monitor. The "AT" must preceed all commands directed at the modem. The "D" instructs the smartmodem to dial. The dash in the phone number is not needed. To dial in the Touch-Tone mode type AT DT 5681381 (ENTER). You can also pulse and tone dial at the same time, for example: AT DP9, T5681381. The "P" instructs the modem to pulse dial and the "T" to tone dial. This is handy if your phone is connected to a rotary dial PBX. The comma after

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DP9 creates a pause. Various other dialing commands are available to allow for numerous combinations.

Automatic Answering is the best feature of the smartmodem. The command AT S0=4 (ENTER) instructs the modem to answer your phone on the fourth ring. This command can be set up as high as the 255th ring. Your caller would have to have a lot of patience to wait that long. The default value is zero, i.e., the modem will answer the phone on the first ring. You can also force the modem to answer the phone without waiting for a ring. This feature is handy if you need to transfer a call already in progress. The Automatic Answering feature allows me to make my home computer accessible from my office. I simply dial my home number, wait for the tenth ring, and then hook my terminal at the office to my microcomputer. The ten rings prevent the computer from answering other calls that may come during the day.

The audio speaker can also be controlled. Normally the speaker is on during the dialing and ringing cycles and promptly cuts off when a carrier is detected. This can be overridden by the AT M2 (return) command. The "M2" instructs the modem to keep the speaker activated. When this is done you can hear the computers communicating between each other. You may also turn the speaker off completely with the "M0" command.

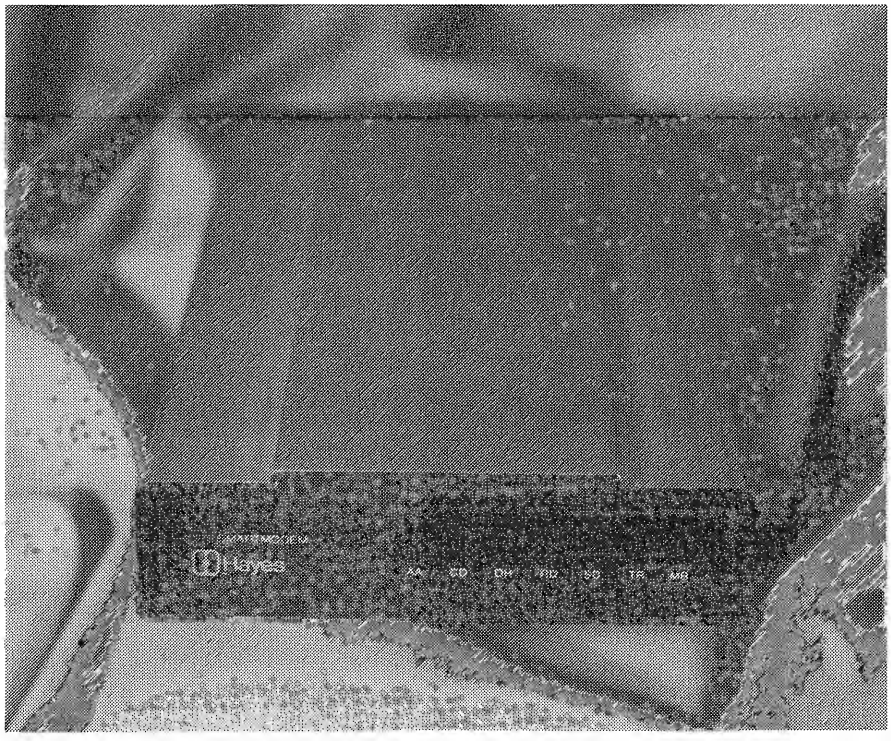
The smartmodem defaults to the full-duplex mode. This may be changed to half-duplex by keyboard entry in the command state. Other commands available include: control of transmitter carrier, automatic repeat, echo control, telephone switch hook control and software reset. The smartmodem has seventeen Set Registers that control the modem's operational parameters. These, of course, can also be accessed. The Set Registers establish the timing of the dialing and answering functions. The registers are outlined below.

Register	Control Purpose
S0	Number of rings to answer.
S1	Number of rings to answer that have occurred.
S2	Escape code allowing user to return to command state from on-line state.
S3	Carriage return character.
S4	Linefeed character.
S5	Backspace character.
S6	Sets length of time modem will wait to dial after picking up phone.
S7	Sets length of time modem will wait for a carrier after dialing or answering.
S8	Sets the pause time for the comma used in the command state.
S9	Length of time carrier must be activated for the modem to recognize it.
S10	Length of time modem takes to disconnect after loss of carrier.
S11	Speed control for Touch-Tone dialing.
S12	Length of time required before and after the escape code is entered.
S13	UART status register.
S14	Option register.
S15	Flag register.
S16	Allows user to put modem in self-test mode.

Registers S13, S14 and S15 are bit mapped. The manual states that they are used for factory testing of the smartmodem and not intended to be utilized for controlling the modem.

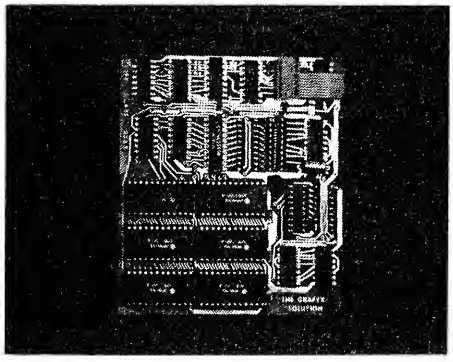
The Hayes Smartmodem is a well designed and much needed microcomputer modem. The smartmodem allows the microcomputer user full flexibility in controlling the modem functions by simple keyboard entry or program control. It is compatible with all U.S. telephone systems.

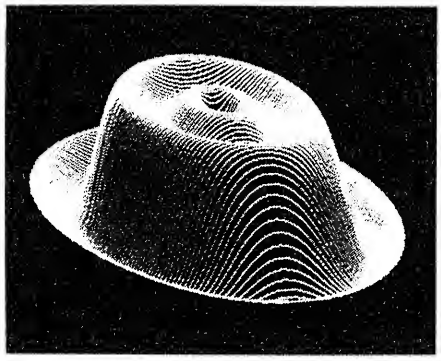
Besides communicating with other computers, the smartmodem can be used as an automatic dialer for your personal phone calls, to automatically answer unattended phones, to connect to amateur radio equipment for RTTY operations, to monitor data lines, to connect to local networking, etc. Potential uses for the smartmodem are limited only by your imagination. ■

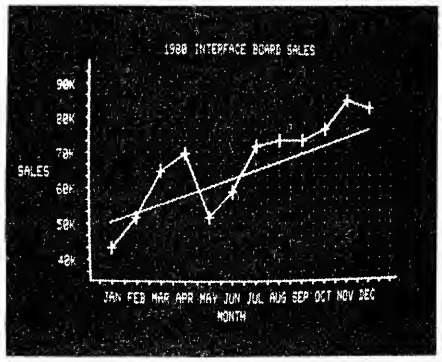


Ed. note — Hayes has just released the 300/1200-baud modem, suggested retail price is $699. More information is available from Hayes Microcomputer Products, 9835 Peachtree Corners East, Norcross, GA 30092, (404) 449-8791.

This evaluation was done using a terminal package; no modem works without one. Be sure to see the article by Don Scarberry and Jim Klaproth on page 24.







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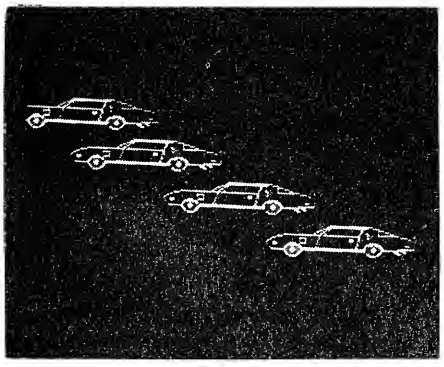

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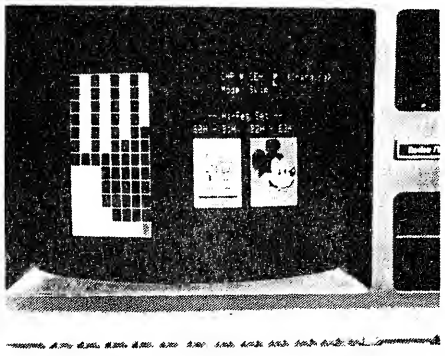

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Charles P. Knight, Arlington, TX

Once upon a time there was an Old Pasha and an Egocentric Camel. Now, the Pasha suddenly came to the realization that he owned a large oilfield. So did the camel. And so did a handful of other wealthy people throughout the world.

One day, when a wellhead burst and hit him on the head with an oil drum, the Pasha had an idea: "Why don't we pool our resources into a large organization of petroleum exporting countries?", he asked his camel, "We could name it using both our initials, O.P.E.C."

"Sure!" the camel replied, "Then we could control the price of oil throughout the whole world, if we could just talk a few of our buddies into joining our little cartel. I'll bet we could really clean up!"

So, after he had topped off his hump tanks for a long journey in the hot desert, the camel trotted off into the dry, oil-rich desert to discuss his idea with a few of his friends. They all liked his idea, and the rest is history.

Meanwhile, on the other side of the world, where all the Camels carry a warning notice from the Surgeon General, petroleum products (read gas) were selling at delightfully low prices. You see, our Uncle Sam had never heard of the Pasha — heck, he thought Pasha was a polite name for the little house out in the back yard of his big old Texas ranch. The rest of this is also history.

Now, about this time, Uncle Sam's people were beginning to take notice that gas was going up in price. They tried all sorts of gimmicks to reduce their consumption, but retain their big cars and lead feet. Most of the more outlandish schemes were doomed to failure: We could all park our cars and ride the family camel to work, but this scheme probably wouldn't work either. Seriously though, for me, the scheme that works the best is keeping a tight rein on the condition of my car.

When you monitor the fuel consumption of your car, any sudden drop in gas mileage is a sure signal that something is wrong. Usually, the problem will show up as increased fuel consumption long before it can be noticed in the way the car runs.

I have long kept such records in a little book on the dashboard of each of my cars. Each time I fill up, I record the odometer reading, the amount of gas purchased, and the amount of money paid to the attendant. From this I calculate the distance I have traveled and the miles per gallon of my car. If there is a significant departure from the norm in any of the calculated results and there has been no error in my data collection, I know something is wrong and I can have my mechanic correct it at once — *before* it costs me several dollars in wasted gas.

It wasn't long after I got my TRS-80 that I wanted to have my computer do this job for me. I tried various programs, both those that were commercially available and those I wrote myself. Each had its shortcomings and I still had to transfer the calculated data into my little book. This program is the culmination of those efforts. It won't make gas any cheaper, but it will help keep tabs on where it is going. It also keeps a nice record to use at tax time, if needed.

I have never felt much fondness for programs that come up without any screen formatting or graphics. They are dull to run and in many cases add to the possibility of making a mistake. The graphics are built into the computer and the memory is available, so I thought I'd use them to make the program mildly entertaining as well as useful. The first thing the program greets you with is a gas pump with its wheels turning for the amount. The wheels turn a bit while my copyright notice is displayed then you are asked if you need instructions. The motion on the screen doesn't stop until you key in your response of "Y" or "N." After the instructions are displayed, you are asked for the starting odometer reading. If the program is being used to calculate the gas costs for a trip, then this would be the odometer reading when the trip began; otherwise, it is the reading on your odometer when you first filled the car up.

Next the screen is formatted for the data input phase of the program. The screen is divided into three columns representing the odometer reading, gallons purchased, and price paid. You answer each question in turn and the next line appears awaiting more input. When you have more than a screenful, the screen clears and the input starts over at the top. To exit this phase, you must input an @ sign for the odometer reading.

It is popular at certain service stations to sell gas by the liter instead of by the gallon. This is no problem, for the program will change the entry to gallons if you input the liter total followed by either an upper or lowercase "L." As each line is input, the gas pump displays the price per gallon on its face. If there is much difference between the amount shown here and the stated pump price, you had better find another station to buy your gas from, or tell the operator to have his pump checked. I have found many more stations than I expected whose pump price didn't agree with the total amount being charged for gas. In a couple of cases this amounted to more than a dime per gallon.

When you have input all the data you have for this session, simply enter "@" for the odometer reading. The

pump and center screen will be erased and the results of the calculations displayed. The screen will display for each fillup: odometer reading, miles driven, gallons purchased, price paid, miles per gallon, cost per gallon and cost per mile. When you have viewed the data to your satisfaction, press the ENTER key to go on to the next page of data or, if this was the last page, display the totals and averages. The data displayed are the total miles driven, total gallons consumed, average (mean) miles per gallon, average cost per mile, and average cost per gallon.

While the dots dance about on the screen, you may examine the results to your satisfaction. When you are through, you may end the program, view the individual data again, or output the results to your line printer. You may also mesmerize yourself (and your stupid camel) with the flashing periods, if you feel so inclined.

After the initialization in lines 180 to 220, the screen is drawn with the code in lines 240 to 560. In line 560, it will be noticed that the last location on the screen is POKEd rather than PRINTed at. If a PRINT@ were attempted here, it would cause the screen to scroll even though the carriage return was suppressed with a semicolon. The contents of the last screen location must always be POKEd to avoid scrolling up and messing up the graphics.

The program then jumps around the input subroutine to line 860. Lines 880 to 960 keep a small amount of motion on the screen while the computer awaits your answer to the Need Instructions question.

The main body of the input phase is in lines 1140 to 1520. The code simulates a kind of INPUT AT statement which BASIC lacks. The starting and ending screen locations are passed to the input subroutine at line 640 as S% and E% respectively. The subroutine returns with TT$ being equal to the data input. This data is then tested to see if it is the type that the program can use, otherwise the program goes back and gets the data again. The test in line 1220 ensures that each successive odometer reading is greater than the last.

The only way out of the input phase is by inputting "@" for the odometer reading. If you notice an error in your last line of input, you may repeat that line by inputting an up arrow for any of the three input values. If you go farther than one line before you notice your mistake, you must break and run the program again. That really isn't so bad: you'll get to watch the neat graphics again.

As each item is input, it is assigned a place in a one dimensional array. The miles per gallon, price per gallon, and cost per mile for each fillup are calculated in lines 1440 - 1480. Line 1500 contains the code for clearing the screen when a new page is to be input.

Lines 1540-1700 print the data on the screen a page at a time, calling the routines at 2060 and 2070 when each page is filled. At the conclusion of the display, averages are calculated. The variable SK is used so that this computation will only be performed only once. A small menu is displayed under the results so that you may select hard copy, another display of the data, or you may end the program.

The code for the line printer is similar to the code for displaying except for the format. Line 2260 contains a

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test for the current line number and if it is greater than 56, the printer is moved up to the top of the next page. Line 2440 spits the completed report out of the printer. Now, you may look at and cry about the price of transportation in today's economy.

GASMIZER won't save you more than a few bucks but, if you use it regularly, you might come to some new realizations about your cars and the way you use your fuel. After all, we haven't found any new fuel sources yet, so it only makes sense to economize on what we have. No, this program certainly won't drive the Pasha (or his camel) to the brink of starvation, but it could be a start in driving you toward better gas consumption.

Program Listing for GASMIZER

```
10 REM ******************************
20 REM GASMIZER GAS MANAGEMENT PRGRM
40 REM COPYRIGHT (C) 1981
50 REM CHARLES P. KNIGHT
60 REM P.O. BOX 6072
70 REM ARLINGTON, TX. 76011
80 REM (817) 640-4452
90 REM ALL RIGHTS RESERVED
100 REM MIN SYSTEM 16K LII TRS-80
110 REM ******************************
160 REM  In this listing 0=zero O=let
  ter ^=up arrow -=minus
180 CLS:PRINT@525,CHR$(23)"Initializing
  ":CLEAR250:DIMOD(200),GA(200),PR(200)
  ,MI(200),MG(200),PG(200),CM(200)
200 P1$=" #####  ###     ##.#     $$##.
  ##   ##.#    $$#.###   $$#.###"
220 C=0:E%=0:S%=0:TT$="":X$="":M1=0
240 CLS:DT$="##.##":DS$="$##.##":PRINTC
  HR$(191)STRING$(43,131)STRING$(21,191
  );:PRINT@108,CHR$(191);:PRINT@127,STR
  ING$(2,191)"     "STRING$(10,191)" "S
  TRING$(9,191);
260 PRINT@154,STRING$(2,191)" "STRING$(
  11,191)"    "CHR$(191)" "STRING$(16,"
  $")" "CHR$(191);
280 PRINT@192,CHR$(191)"     "STRING$(3
  ,191);:PRINT@209,STRING$(3,191)"
  "STRING$(3,191)" "STRING$(3,191);
300 PRINT@236,CHR$(191);:PRINT@255,STRI
  NG$(2,191)"     "STRING$(3,191)"   "S
  TRING$(4,191)" "STRING$(3,191)"     "
  STRING$(3,191)" "STRING$(4,191);
320 PRINT@289,STRING$(7,191)"    "CHR$(
  191)" "STRING$(16,191)" "STRING$(2,19
  1)"     "STRING$(3,191)"    "STRING$(
  3,191)" "STRING$(11,191);
340 PRINT@357,STRING$(3,191)"    "CHR$(
  191)" "STRING$(5,191)"00.00"STRING$(6
  ,191)" "STRING$(2,191)
360 PRINT@385,"     "STRING$(10,191)" "
  STRING$(3,191)"     "STRING$(3,191)"
  "
380 PRINT@413,STRING$(11,191)"    "CHR$
  (191)" "STRING$(9,191)STRING$(7,191)"
   "STRING$(2,191);
400 PRINT@468,CHR$(191)"  "CHR$(191);:P
  RINT@492,CHR$(191)" "STRING$(16,191)"
   "STRING$(2,191);
420 PRINT@527,STRING$(14,191);:PRINT@55
  6,CHR$(191)"     "STRING$(8,191)"
   "STRING$(2,191);
440 PRINT@591,STRING$(3,191)"  "CHR$(19
  1)"  "CHR$(191);:PRINT@620,CHR$(191)"
    $  "STRING$(8,191)"  $  "STRING$(2,
  191);
460 PRINT@655,STRING$(14,191);:PRINT@68
  4,CHR$(191)"  $  "STRING$(8,191)"  $
   "STRING$(2,191);
480 PRINT@724,CHR$(191)"  "CHR$(191)"
  "STRING$(3,191);:PRINT@748,CHR$(191)"
    $  "STRING$(8,191)"  $  "STRING$(2,
  191);
500 PRINT@783,STRING$(14,191);:PRINT@81
  2,CHR$(191)"  $  "STRING$(8,191)"  $
   "STRING$(2,191);
520 PRINT@852,CHR$(191)"  "CHR$(191);:P
  RINT@876,CHR$(191)"  $  "STRING$(8,19
  1)"  $  "STRING$(2,191);
540 PRINT@896,CHR$(191)"    Copyright (
  C) 1981 by C. P. Knight     "CHR$(191
  );
560 PRINT@959,STRING$(2,191)STRING$(43,
  176)STRING$(19,191);:POKE16383,191
580 FORI=1TO105STEP7:PRINT@371,USINGDS
  $;I*2/100;:NEXTI
600 PRINT@897,STRING$(43,32);
620 GOTO860
640 C=E%+1-S%:TT$="":PRINT@S%,STRING$(C
  ,".");:M1=S%:X$=INKEY$
660 PRINT@M1,CHR$(140);:X$=INKEY$:PRINT
  @M1,".";:IFX$=""THEN660
680 IFX$=CHR$(13)THEN720ELSEIFX$=CHR$(8
  )THENGOSUB800ELSEGOSUB740
700 GOTO660
720 TT$=RIGHT$(TT$,C):PRINT@M1,STRING$(
  C-LEN(TT$),32);:RETURN
740 IFASC(X$)<32ORASC(X$)>122THENRETURN

760 PRINT@M1,X$;:TT$=TT$+X$:M1=M1+1:IFM
  1>E%THENM1=E%
780 RETURN
800 M1=M1-1:IFM1<S%THENM1=S%
820 PRINT@M1,".";:TT$=LEFT$(TT$,M1-S%)
840 TT$=LEFT$(TT$,M1-S%):RETURN
860 PRINT@899,"Need instructions ";
880 S=917
900 IK$=INKEY$:IFIK$="N"ORIK$="n"THEN98
  0ELSEIFIK$="Y"ORIK$="y"THEN2460
```

```
920 PRINT@S,".";:PRINT@371,USINGDS$;2*S
  /100+RND(10);
940 S=S+1:IFS>937THENS=917:PRINT@S,STRI
  NG$(21,32);
960 GOTO900
980 FORPA=65TO960STEP64:PRINT@PA,STRING
  $(43,32);:NEXTPA
1000 PRINT@514,"Enter starting odometer
   reading";
1020 S%=547:E%=S%+6:GOSUB640:IFTT$=""TH
  EN1020ELSEOD(0)=VAL(TT$)
1040 U=1
1060 FORPA=65TO960STEP64:PRINT@PA,STRIN
  G$(43,32);:NEXTPA
1080 PRINT@66,"Odometer";
1100 PRINT@84,"Gallons";
1120 PRINT@100,"Amount";
1140 S1=130:REM  COUNTER TO KEEP TRACK
  OF SCREEN LOCATION
1160 S%=S1:E%=S%+6:GOSUB640:IFTT$=""THE
  N1160ELSEOD(U)=VAL(TT$)
1180 IFTT$="@"THEN1540
1200 IFTT$="^"ANDS1>193THENS1=S1-64:U=U
  -1:GOTO1160
1220 IFOD(U)<=OD(U-1)THEN1160
1240 MI(U)=OD(U)-OD(U-1)
1260 S%=S%+18:E%=S%+6:GOSUB640:GA(U)=VA
  L(TT$):IFRIGHT$(TT$,1)="L"ORRIGHT$(TT
  $,1)="1"THENGA(U)=GA(U)*.2365:PRINT@S
  %,USING"##.##";GA(U);
1280 IFTT$=""THENS%=S%-18:GOTO1260
1300 IFTT$="^"ANDS1>193THENS1=S1-64:U=U
  -1:GOTO1160
1320 IFGA(U)<=0THENS%=S%-18:GOTO1260
1340 TG=TG+GA(U)
1360 S%=S%+17:E%=S%+6:PRINT@S%-1,"$";:G
  OSUB640:PR(U)=VAL(TT$)
1380 IFTT$=""THENS%=S%-17:GOTO1360
1400 IFTT$="^"ANDS1>193THENS1=S1-64:U=U
  -1:GOTO1160
1420 TP=TP+PR(U)
1440 MG(U)=MI(U)/GA(U)
1460 PG(U)=PR(U)/GA(U)
1480 CM(U)=PR(U)/MI(U):PRINT@371,USINGD
  S$;PG(U);
1500 S1=S1+64:IFS1>960THENS1=130:FORPA=
  130TO960STEP64:PRINT@PA,STRING$(42,32
  );:NEXTPA
1520 U=U+1:GOTO1160:REM   U= ARRAY INDE
  X VARIABLE
1540 PRINT@44,STRING$(19,131);:PRINT@10
  04,STRING$(19,176);
1560 FORPA=65TO946STEP64:PRINT@PA,STRIN
  G$(62,32);:NEXTPA
1580 PRINT@65,"Odometer Miles  Gallons
   Price      MPG     Cost/Gal  Cost/Mile
  ";
```


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```
1600 PRINT@129,STRING$(62,140);
1620 PA=193
1640 FORI=1TOU-1
1660 PRINT@PA,USINGP1$;OD(I),MI(I),GA(I
  ),PR(I),MG(I),PG(I),CM(I);
1680 PA=PA+64:IFPA>877THENPA=193:GOSUB2
  060:FORE=193TO877STEP64:PRINT@E,STRIN
  G$(62,32);:NEXTE
1700 NEXTI:GOSUB2060:GOSUB2100
1720 IFNOTSKTHENFORE=1TOU-1:AM=AM+MG(E)
  :AC=AC+CM(E):AG=AG+PG(E):NEXTE:AM=AM/
  (U-1):AC=AC/(U-1):AG=AG/(U-1):SK=-1
1740 PRINT@321,STRING$(62,131);
1760 PRINT@193,"          Grand Totals &
   Averages";
1780 PRINT@705,STRING$(62,131);
1800 PRINT@393,"Total Miles Driven :";:
  PRINTUSING"#####";OD(U-1)-OD(0);
1820 PRINT@457,"Total Gallons Consumed
  :";:PRINTUSING"####.#";TG;
1840 PRINT@521,"Average Miles per Gallo
  n :";:PRINTUSINGDT$;AM;
1860 PRINT@585,"Average Cost per Mile :
  ";:PRINTUSING"$#.###";AC;
1880 PRINT@649,"Average Cost per Gallon
   :";:PRINTUSINGDS$;AG;
1900 PRINT@834,"<H> For printed report
  <E> To end <R> To repeat display";
1920 S=897:IK$=INKEY$
1940 IK$=INKEY$:IFIK$="E"ORIK$="e"THENE
  ND
1960 IFIK$="R"ORIK$="r"THENGOSUB2100:GO
  TO1560
1980 IFIK$="H"ORIK$="h"THEN2120
2000 PRINT@S,".";:PRINT@S-832,".";:IFS>
  =957THENS=897:PRINT@S,STRING$(61,32);
  :PRINT@S-832,STRING$(61,32);
2020 S=S+1
2040 GOTO1940
2060 PRINT@898,"Press <ENTER> to contin
  ue.....
  .";
2080 FORE=1TO55:NEXTE:PRINT@905,STRING$
  (5,143);:FORE=1TO20:NEXTE:PRINT@905,"
  ENTER";:TT$=INKEY$:IFTT$<>CHR$(13)THE
  N2080ELSERETURN
2100 FORP2=65TO946STEP64:PRINT@P2,STRIN
  G$(62,32);:NEXTP2:RETURN
2120 LPRINTSTRING$(63,"=")
2140 LPRINTTAB(20)"Gasoline Consumption
   Record"
2160 LPRINTSTRING$(63,"=")
2180 LPRINTCHR$(13):REM CHANGE TO WHATE
  VER CODE CAUSES A LINE FEED ON YOUR P
```


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 RINTER
2200 LPRINT"Odometer Miles  Gallons  Pr
  ice     MPG     Cost/Gal  Cost/Mile"
2220 FORI=1TOU-1
2240 LPRINTUSINGP1$;OD(I),MI(I),GA(I),P
  R(I),MG(I),PG(I),CM(I)
2260 IFPEEK(16425)>56THENLPRINTCHR$(12)

2280 NEXTI
2300 LPRINTSTRING$(63,95)
2320 LPRINT"Total Miles Driven :";:LPRI
  NTUSING"#####";OD(U-1)-OD(0)
2340 LPRINT"Total Gallons Consumed :";:
  LPRINTUSING"####.#";TG
2360 LPRINT"Average Miles per Gallon :"
  ;:LPRINTUSINGDT$;AM
2380 LPRINT"Average Cost per Mile :";:L
  PRINTUSING"$#.###";AC
2400 LPRINT"Average Cost per Gallon :";
  :LPRINTUSINGDS$;AG
2420 LPRINTCHR$(12)
2440 GOTO1900
2460 PRINT@67,"This  program  calculate
  s  the gasoline";
2480 PRINT@131,"consumption  of your  c
  ar or truck.  It";
2500 PRINT@195,"requires  you  to  ente
  r  the  starting";
2520 PRINT@259,"odometer  reading and,
  for each fillup,";
2540 PRINT@323,"the odometer reading, g
  allons required,";
2560 PRINT@387,"and price  paid.  You m
  ay enter  liters";
2580 PRINT@451,"instead of gallons if y
  ou append an "CHR$(34)"L"CHR$(34);
2600 PRINT@515,"to your entry for gallo
  ns.  You may in-";
2620 PRINT@579,"put  data  for  up to 2
  00  fillups.  To";
2640 PRINT@643,"stop  inputting  and  b
  egin  displaying";
2660 PRINT@707,"results,  enter  "CHR$(
  34)"@"CHR$(34)"  for  the odometer";
2680 PRINT@771,"reading.  You may reque
  st as many print";
2700 PRINT@835,"outs  as you wish using
    the same data.";
2720 PRINT@899,"Press <ENTER>  to conti
  nue.............";
2740 FORE=1TO55:NEXTE:PRINT@906,STRING$
  (5,143);:FORE=1TO20:NEXTE:PRINT@906,"
  ENTER";:TT$=INKEY$:IFTT$<>CHR$(13)THE
  N2740ELSE980 ■
```


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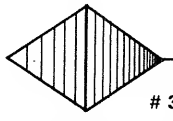

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Color Computer communication —

An evaluation of COLORCOM/E version 2.0

Color Computer

Darrel Wright, Hillsboro, OR

Out of the thousands of programs written for the Color Computer, one finds many good programs and occasionally a super program. This program fits the latter category — super!

COLORCOM/E converts the mild-mannered TRS-80 Color Computer into a powerful telecommunications terminal capable of communicating with computers anywhere in the country. It can be used with 4K, 16K or 32K Color Computers.

The Program

COLORCOM/E functions in one of three operation modes: the advanced entry, command or on-line mode. There is complete interaction between the three modes.

When you first turn on COLORCOM/E, it comes up in the advanced entry mode. In this mode, you can enter data from the keyboard or jump to the command mode to load cassette files prior to entering the on-line mode. From the on-line mode, you can communicate with another computer or jump to the command mode and scan data already received from another computer. When you complete the call to another computer, the program automatically transfers control to the command mode. In the command mode, you can manipulate the data received from the on-line session or jump back to the advanced entry mode to call another computer.

The ability to jump around in the different operation modes gives you tremendous latitude in structuring a communications session to match your individual needs.

To support data reception/transmission with another computer, the program sets up a large text buffer. Table 1 shows the approximate size of the buffer for each model of Color Computer:

Table 1

Color Computer Model	Buffer Size
4K Machine	2100 bytes
16K Machine	14200 bytes
32K Machine	30300 bytes

From this large buffer, the program maintains one or two dynamic buffers to receive or transmit data. If you elect to load cassette files or enter text at the keyboard (for transmission after you go on-line), the program sets up a transmit-data buffer just large enough to hold the files or data you've entered. The remaining available memory is allocated to the receive-data buffer. If you elect not to enter files or keyboard data, COLORCOM/E uses all available memory for the receive-data buffer. With this structure in mind, let's look at the modes in more detail.

Advanced Entry Mode (AEM)

The AEM is used to communicate with smart modems or to enter keyboard data prior to going on-line. For those of you lucky enough to own smart modems, COLORCOM/E contains a command (the BREAK key) that sends control codes to the modem without transmitting them over the telephone lines. The control sequence is ended when your modem places a call or when you press the BREAK key a second time.

The second feature, entering data at the keyboard, is especially valuable when talking with networks or bulletin boards that require log-on sequences. Most computer networks or bulletin boards require some form of sign-on sequence before permitting file transfer between the two computers. While in the AEM, you can enter sign-on messages or text files from the keyboard and transmit them after entering the on-line mode. As an example, CompuServe requires a user identification number and password before logging you onto the network. While in the AEM, you could enter your ID number, password, and perhaps, the necessary commands to jump to different programs within CompuServe. The following example shows how this feature can be used to reduce your connect time (the ID number and password are hypothetical):

```
00000,000
AAAA.BBBBBBB
GO PCS-40
R ACCESS
TYP SURVIVAL.CC(00000,000)
```

When CompuServe requests your ID number, press a 'downarrow' 1 (the 'downarrow' is used as a control key in COLORCOM/E) to send the ID. When it requests your password, press 'downarrow' 1 again to send your password. When the log-on message is complete, press 'downarrow' 1 as the response for each command prompt within CompuServe to rapidly enter the personal computing area and transfer a program file to your system. In this example, the program SURVIVAL.CC is transferred to your computer. This

process is much faster than manually entering the data in response to each question.

Command Mode (CM)

This is the real powerhouse mode for COLORCOM/E. It contains the commands that control the text buffer, input/output (I/O) operations and data operations. The commands are shown in their respective groups:

Table 2

Command — Operation

Shift uparrow — Scroll display up twelve lines.

Uparrow — Scroll display up one line.

Shift downarrow — Scroll display down twelve lines.

Downarrow — Scroll display down one line.

T — Top of buffer.

CLEAR — Clear received data buffer.

Shift CLEAR — Clear received and transmit data buffers.

V — Set printer RS-232 values.
L — Set host RS-232 values.
S — Set start mark.
E — Set end mark.
W — Writes data to cassette.
P — Prints data in buffer.
R — Reads file from cassette.
M — Motor on/off control.

B — Set capture characters.
> — Word mode on.
< — Word mode off.
Q — Disable/Enable incoming data.
G — Re-enter AEM

Buffer Control Commands

The buffer control commands, shown in the upper third of Table 2, control data movement within the buffer. The scroll commands move the data within the receive-data buffer up or down one or twelve lines each time one of the keys is pressed. The T command automatically displays the oldest data in buffer. The CLEAR command erases all data currently in the receive-data buffer, while the shift CLEAR combination erases all data in both the receive and transmit data buffers. Any files in the transmit-data buffer will remain in the buffer until you enter shift CLEAR.

I/O Control Commands

The I/O control commands, shown in the middle third of Table 2, control all input/output operations. The V and L commands set the printer and RS-232 serial parameter values, respectively. During the print operations, the serial port defaults to the same values used by Color BASIC: 600-baud, 7 data bits, and no parity. When you go on-line, the serial port defaults to 300-baud,

even parity, 7 data bits, normal delay after carriage return, pass linefeed and full duplex operation. The V and L commands are used to override the serial port default values and configure them to your specifications.

In the command mode, you can send all, or a specific portion, of the data in the receive data buffer to the cassette recorder or printer. The set mark and end mark (S and E) commands can be used to designate a specific portion of the receive buffer.

The W command writes all, or a marked portion, of the buffer to the cassette recorder. The P command directs the data to the printer. The R command loads one or more data files from cassette into the transmit buffer. The M command turns the cassette motor on or off.

You can specify that the W command look for, and write to cassette, only data that is marked with either the S or E commands or with automatic capture characters. Automatic capture characters are used by some computers to specify the beginning and ending of specific portions of data. They are covered in greater detail in the following sections.

Data Control Commands

Data control commands, shown in the bottom third of Table 2, control the specification of automatic capture characters, the word-wrap mode, and re-entering the advanced entry mode.

Some computer networks, such as Connection-80 and CompuServe, bracket data files with automatic capture characters. COLORCOM/E can be instructed to look for these characters and store only the data between them in the receive buffer. With COLORCOM/E you can use default characters or specify new automatic capture characters by entering the B command and following the prompts. The default values for the start character is $12 and for the end character is $14.

The > and < commands toggle the word mode on and off, respectively. The word mode prevents words from being split at the end of a line. If a word causes the line length to exceed 32 characters, it is automatically wrapped around to the next line. This feature produces a very readable display.

The Q command is used to disable, or enable, the reception of data from another computer. The command permits you to stop operation in the middle of an on-line session, enter the command mode, and turn off data reception. You can then process the data currently in the buffers, turn on data reception, return to on-line, and resume communicating with the other computer.

The G command is used to restart another on-line operation by entering the AEM. When the command is entered, it clears the receive-data buffer, but leaves the transmit buffer intact.

On-Line Mode

The on-line mode establishes and controls communication with another computer. While in this mode, you can execute the following commands (the downarrow key serves as the control key):

CNTRL 1 — Send a text line from transmit buffer

CNTRL 2 — Send all of the transmit buffer

CNTRL 3 — Freeze/unfreeze receive buffer

CNTRL 5 — Enter the command mode

The first two commands are used only if you entered keyboard data or loaded cassette files prior to going on-line. These commands are extremely useful for transmitting log-on messages, command sequences, or electronic mail that is composed off-line. The example described in the advanced entry mode illustrated how commands 1 and 2 can be used to save significant time when using a network like CompuServe.

The freeze/unfreeze command (CNTRL 3) sets up a powerful method for selectively saving data in the receive buffer. If you elect to freeze the receive buffer, COLORCOM/E will store data in the buffer only if you instruct it to by: 1) unfreezing the buffer or, 2) having automatic capture characters bracket the incoming data. If you elect to unfreeze the buffer, all received data is displayed and stored in the buffer. The program defaults to an unfrozen buffer.

CNTRL 5 is used to jump to the command mode without losing your communication link with the other computer. When you're finished with the command mode, press the space bar to return to the on-line mode.

Documentation

COLORCOM/E is supplied with a twelve-page manual that includes four appendices. The manual leads you from simple through advanced operation. It begins with a simple tutorial designed to help you "get your feet wet." The pages following the tutorial explain the structure and commands used in COLORCOM/E.

The manual does an adequate job of describing the program, but you have to work to locate some of the finer points of the program. As an example, the S and E commands are described on page four, but they are not used until page eight. Other than several minor complaints such as these, the manual is easy to use and provides sufficient information.

Conclusions

I have reviewed literature on most of the Color Computer telecommunications programs on the market and feel COLORCOM/E is the superior package. The documentation is a little weak, but the program makes up for that with a wealth of features.

Oh, I almost forgot something! If you're talking to another Color Computer (or another computer capable of transmitting graphic files), COLORCOM/E can transmit or receive full detail high-resolution graphics!

If you need a telecommunications program that really packs a wallop without denting your pocket, then check out COLORCOM/E! ■

Ed. note — COLORCOM/E is available for $49.95 (plug-in ROM pack), from Eigen Systems, Box 10234, Austin, TX 78766.

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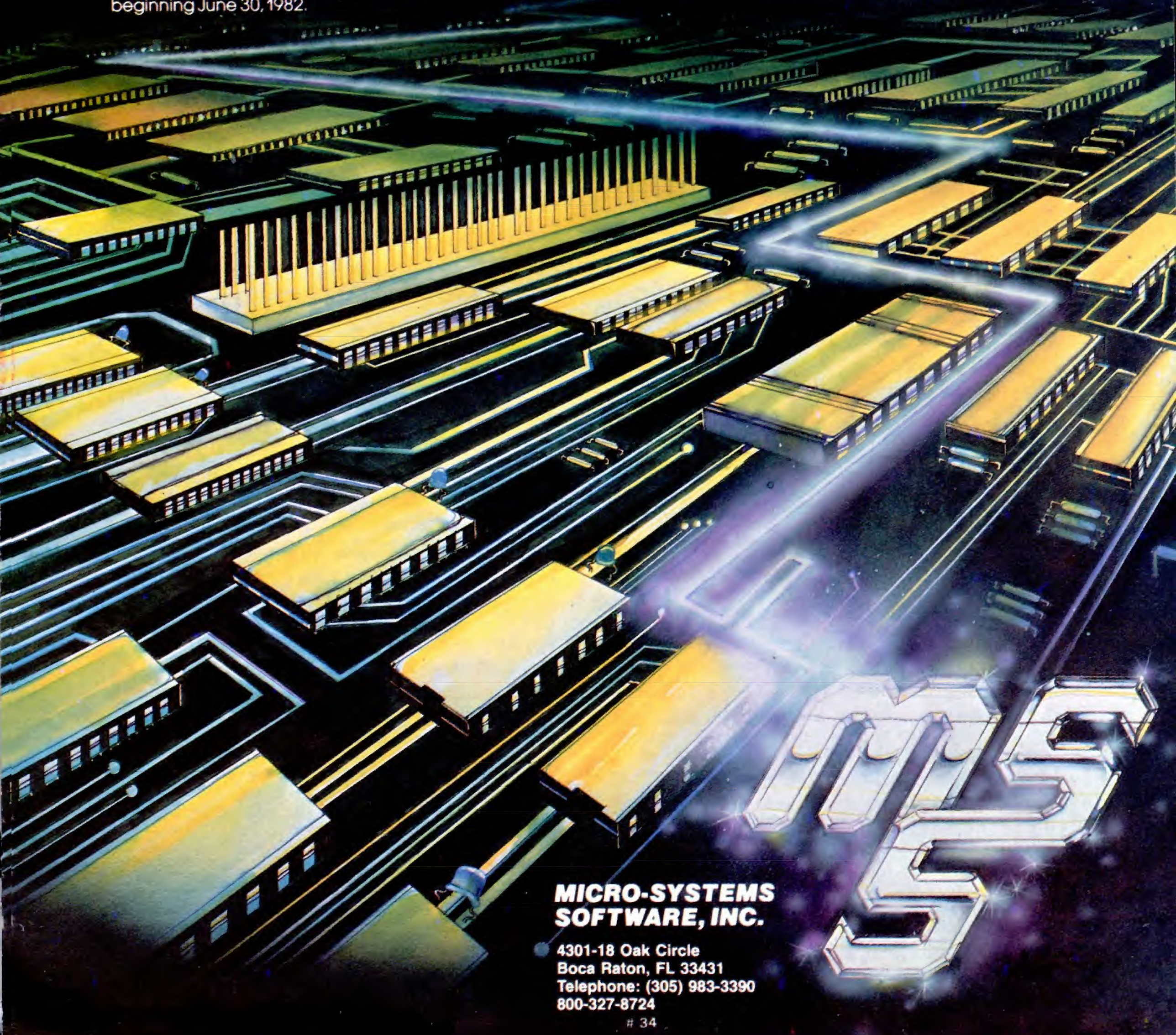

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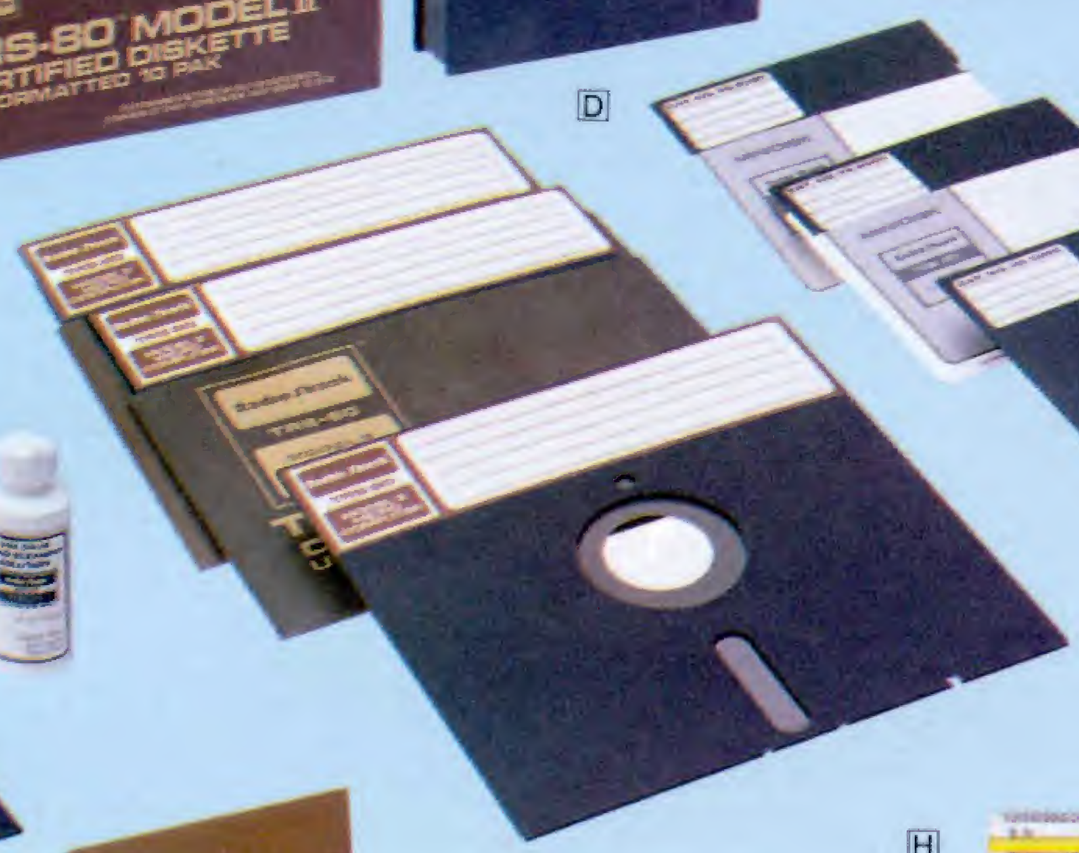

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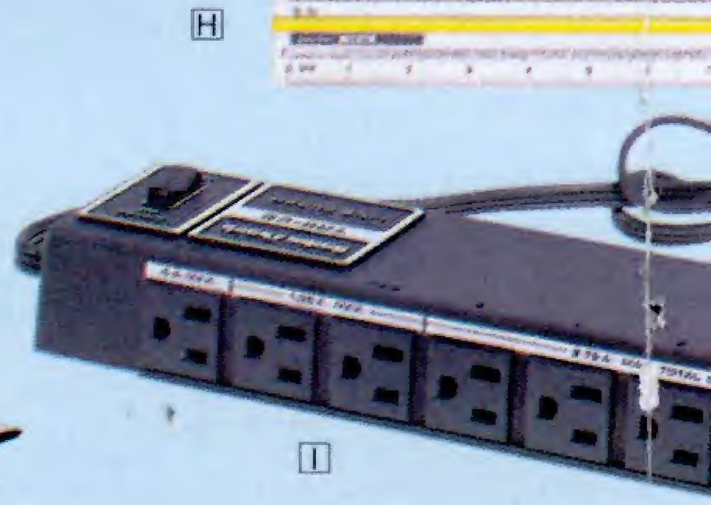

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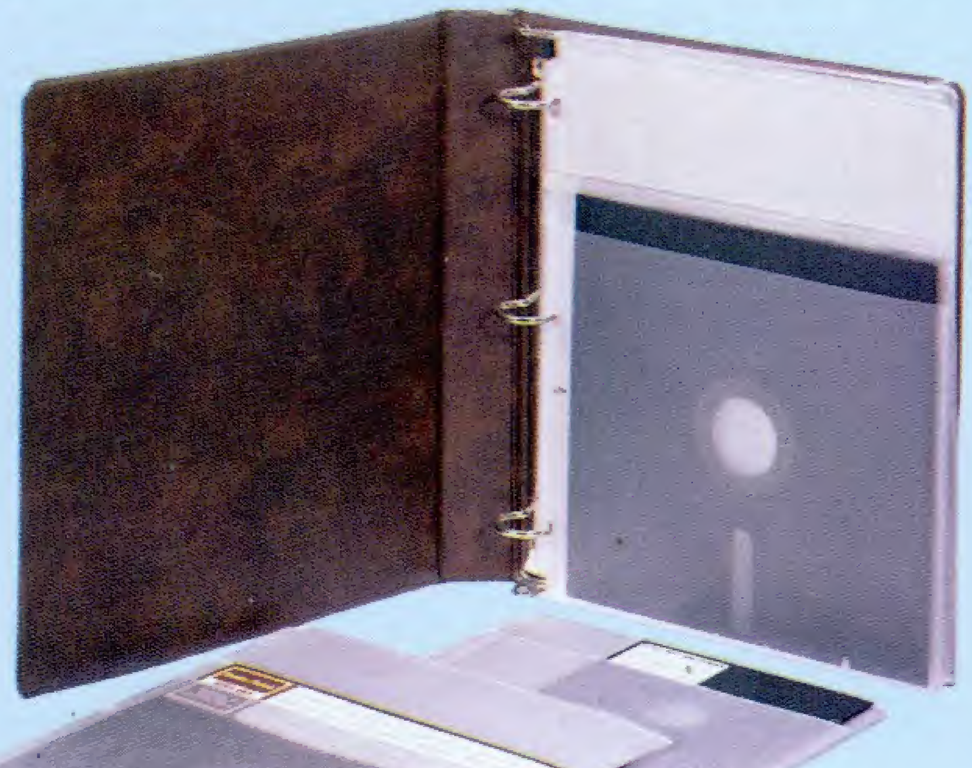

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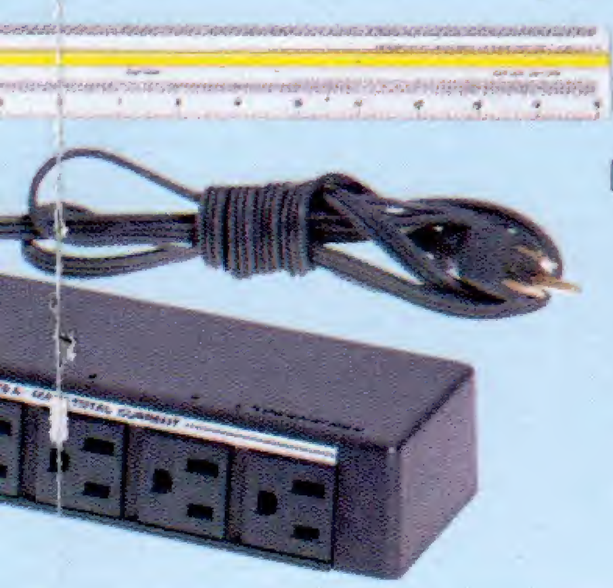

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Variable listing

Analyze your Color Computer programs

Color Computer

Joseph P. Laronda,
Cheshire, CT

It is part of human nature to lose track . . .

This program will list all the variables used in a BASIC program, with the line numbers in which the variables occur. It will also identify the type of statement that the variable is used in, such as READ, INPUT, >, <=, < >, DEFUSR, and others. Typical output to screen will look like:

```
10 A$
30 INPT B$
50 LO$(1)
80 D(N+1) <=
95 READ B$(Y)
```

A line number followed by a variable and nothing else, indicates that the variable appears ahead of an equal sign, as in lines 10 and 50 above. A variable, followed by an operator symbol (like <=), indicates a variable appearing in an IF ... THEN ... ELSE statement.

The program serves two very useful purposes:

It is part of human nature to lose track of which variables you have assigned. This program will list the variables for you, even though your program is not finished. You do not have to run the program you are examining.

If you are examining someone else's program, you can locate every mention of a particular variable. This is useful if you want to revise the program. For example, you might want to change disk statements to cassette statements, or change line lengths, margins and print codes in a word processor. Or, you may want to adapt a portion of a program to use in your own program, such as the justifying portion of a word processor.

Before describing the operating features of the program, let me explain the structure of a line written in BASIC, as it appears in memory, and how the Color Computer uses decimal numbers to represent commands, letters, numbers, and symbols.

The 16K Color Computer has 65535 memory locations, each of which can hold one decimal number (one byte) from zero to 255. Some of these memory locations cannot be changed by the user—they are assigned to the computer's use as Read Only Memory, or ROM. Other memory locations are used by the computer, but can be changed by the user with POKE statements, as when you POKE memory locations 25 and 26 to append cassette programs. Finally, some memory locations are reserved for the user and are called Random Access Memory, or RAM.

When you write a program in BASIC, it is these RAM locations that hold your program, using only the numbers zero through 255.

To see how this works, first type: PCLEAR 1 and ENTER. Now, type this line:

```
10 REM  A
```

Leave two spaces after REM. Now, type: PRINT PEEK (3077) and ENTER. You should get the number 130. 130 represents the word REM, and is recorded at memory location 3077. PEEK simply tells the computer to "see" which number is in a memory location, and PRINT reports the result to the screen.

Type: PRINT PEEK (3078) ; PEEK (3079) ; PEEK (3080) : PEEK (3081) and ENTER. You will get: 32 32 65 0. 32 is a space, 65 is A and 0 tells the computer where the line ends.

The decimal numbers 130, 32, 32, 65 translate to: REM A. Now, type: POKE3077,132 and ENTER. Type: LIST 10 and ENTER. You get: 10 ELSE A. Conclusion? 132 represents ELSE.

POKE is a command that goes to the memory location you specify (3077) and replaces the number in that location (130) with the number you specify (132).

Now, type this short program:

```
10 INPUT N
20 POKE3106,N
30 LIST 40
40 REM  A
```

The spacing in the program is critical. There are two spaces between REM and A. To make sure that you have the exact spacing, type: PRINT PEEK(3106) and ENTER. You should get the number 130—the symbol for REM. If you do not get 130, edit or retype the program for exact spacing.

Now, RUN the program. The "?" asks for an input, of course. Type 133 and ENTER. You should see:

```
40 IF  A
```

The decimal 130 at memory location 3106 has been replaced by 133, the symbol for IF. Interesting? You can run the program as often as you like, using numbers 1 through 255. Do not use 0 (zero), the end-of-line symbol. Remember, type RUN and ENTER. Type N and ENTER, where N is any number from 1 to 255. If you have never done this before, you should find it fun to do.

Sit back and relax while the program prints out line numbers and variables.

See the Color Computer manuals for charts of the ASCII codes.

Try inputting 171. You get a "+," right? That is very interesting, since the ASCII code for "+" is supposed to be the decimal 43. Well, it is, but one of the peculiarities of 16K Extended BASIC is that it uses 43 with unnumbered, direct statements and 171 within program lines! The computer will recognize 43 within program lines, however.

If you RUN, input 43 and ENTER, you will get a "+". Try this. Type: PRINT CHR$(43) and ENTER. This will produce a "+". Type: PRINT CHR$(171) and ENTER. This will produce a graphic block. What this means is that if you are searching in memory for a "+", you must search for the number 171. The symbols -, *, and / also use two different numbers.

Run the program and input 255. You will get:

```
40 PPOINT A
```

Notice that one of the spaces is missing. The computer interprets the numbers 255, 32 (two bytes) as a single word, PPOINT. Curiouser and curiouser! Each time the computer finds 255 in a program line, it always combines it with the next number (if it is not zero) to form a command or function word. Some combinations of 255 and another number are not used (255, 220 for example).

Bear in mind that the numbers which are in memory are produced by the computer in response to your typed orders. When you type PPOINT, the computer inserts the number sequence 255, 32. Unless we are examining the program numbers in memory for some special reason, we normally pay no attention to them.

Now, change line 20 in the program to:

```
20 POKE3107,N
```

Type RUN and ENTER. Type 146 and ENTER. Result: 40 INKEY$ A. You can experiment by inputting numbers 1 through 255. You will discover that 255,34 through 255,127 are not used. Those combinations will

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produce "!". Also, 255,162 through 255,255 are not used. They will produce "!". There are even six commands that use a triple byte: DEFUSR is produced by 185,255,131. To see this effect, type POKE3106,185:POKE3107,255: POKE3108,131. Type LIST 40 and ENTER. Line 40 will now read: 40 DEFUSRA. Also, there are 14 double-byte tokens which do not begin with 255 (GOTO and GOSUB are both 129,165). However, they also are "combination" commands.

Each memory location holds a single number. Numbers, and certain number pairs or triplets, are interpreted by the computer as a word, letter, number, or symbol. Each line of BASIC is preceded by four bytes. The first pair of numbers tells the computer the memory location at which the next line in the BASIC program begins. The second pair of numbers is used by the computer to print the program line number.

In our sample POKE program, there are four numbers ahead of INPUT N in line 10. The first two are 12 and 9. This tells the computer that the next program line (line 20) begins at location 3081, (12*256+9). The second pair of numbers, 0 and 10, produces the line number 10 (0*256+10), visible in the listing on the screen. You do not need to understand all of this to follow the discussion.

If you happen to be interested in the way lines are numbered, you ought to know that 256 is the hex number 16-squared, and that each memory location can hold eight single binary digits. 11111111, in base two, is the number 255—the maximum value for a memory location.

Program Operation

Type the program and CSAVE it to tape. PCLEAR 1 for plenty of memory. Load or type the BASIC program (or part of a program) which you want to examine into the computer. APPEND the Variable Listing Program. The computer should now contain the program to be examined, followed by the Variable Listing Program. If necessary, renumber the program being examined so that line numbers do not overlap. Turn the sound up on your monitor. Type: GOTO6000 and ENTER. If you want a printed listing, type P and ENTER when the input question mark appears. Otherwise, just press ENTER for a screen output.

Sit back and relax while the program prints out the line numbers and variables. This is a fairly slow process, since the program examines every character in every line (except REM lines). You can stop to examine output on the screen by pressing SHIFT and @ simultaneously. Continue by pressing ENTER, just as you do when using BASIC's LIST function. When the analysis is finished, you will hear a single long tone (see line 6186) and the blinking cursor will return. This is all you really need to know in order to use the program.

Program Description

The program is somewhat complicated and took many weeks to design, refine, and test. The program was tested by examining every BASIC program in six months of *Chromasette* tapes. Line 6006 PEEKs at memory locations 25 and 26. These locations always tell where, in memory, to find the first number of the first

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line of any program in the computer.

X is the memory location of the first number of the first line of the program being examined. In line 6008, S is the number of the line being examined. Line 6010 ends the program search if a line number is greater than 6000. Line 6012 looks at the first number in the program line to see if it is a REM statement (130 is REM, 58 appears ahead of an apostrophe used as a REM substitute) or a DATA statement (134 is DATA) and if it is, skips that line and goes on to the next line. I am assuming that no line begins with a colon.

Line 6014 begins a loop in which A takes on the value of each number in a line. Line 6016 checks for an end-of-line 0, and if it finds 0, increments X by 5 and begins examining the next line. In line 6018, if A is a quotation mark, it goes to a routine at line 6188 that searches for an ending quotation mark or an end-of-line 0. This routine can speed up the program by as much as sixteen percent.

Lines 6020 through 6028 are asking if A is 179 (+), 137 (INPUT), 141 (READ), 180 (<), or 178 (>). If none of these numbers is found, lines 6030 and 6032 move A to the next position in the program line, and a new search begins. If any of the numbers listed in lines 6020 to 6028 are located, the program jumps to one of two major analysis routines.

The routine beginning at line 6034 stores thirty numbers to the left of an =, <, or > token. A token is the number, or numbers, which represent a word, numeral, letter or symbol. These numbers are stored in T(1) through T(30), by lines 6034 through 6042. Storing thirty numbers is an arbitrary decision, but the speed of the program is not significantly changed by increasing or decreasing this figure.

The program stops analyzing the array when it reaches the last character of a variable. There actually are some READ lists that are longer than thirty characters. The second routine begins at line 6122 and stores thirty characters to the right of an INPUT or READ token.

Let's look at the first routine. Line 6044 begins an analysis loop which either aborts, or ends with line 6080. Line 6046 stops the analysis routine if a pair of numbers to the left of a variable equals the number of the line being examined, in which case, the variable is printed, beginning with line 6084. Line 6044 is necessary for lines like 20 A=N+1, where the variable immediately follows a line number. SS is calculated for each pass through the loop. Line 6048 changes any spaces (32) to 0 in the array. Later, 0's will be rejected by the printing loop at line 6092. Lines 6054 through 6062 are not entered by a search for a variable in front of an equal sign, since G and GG are set to zero. Line 6064 detects the triple token for DEFUSR, prints I$, and enters the printing routine at line 6090. Lines 6066, 6068, and 6070 do the same for TIMER, FOR, and DEFFN. Line 6072 detects RND (255, 132), and aborts the loop. Line 6074 detects + (171), - (172), * (173), and / (174). These are saved in the array and the next pass is started.

Line 6076 detects ELSE (132), THEN (167), NOT (168), AND (176), OR (177) and the right halves of LEN (255,135), VAL (255,137), ASC (255,138) and JOYSTK (255,141). These are all zeroed, the analysis stops, and

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the variable array is printed. Line 6078 detects all tokens larger than 133 (including double byte tokens beginning with 255) not already saved by previous lines, and aborts the loop. I$, H, G, and GG are nulled by assignments which may have been made in lines 6050 through 6062.

In line 6080, the first IF detects the end of a line (0), or the end of a statement (: is 58). It zeroes 58 and prints the variable. The second IF detects numbers between 33 and 122 (ASCII codes from ! to lower case z), saves them and continues the loop. The last ELSE zeroes any token that has passed through all the previous conditions and goes on to print the variable string. H, G and GG are zeroed in line 6082. For neatness, this line also zeroes a left parenthesis (40 is "(") if there is no parenthesis on the right. The lonesome "(" occurs in some IF statements.

Line 6084 detects printer tabulation greater than 60, zeroes tab variable B and starts a new line if the printer option was selected. Line 6086 sets the printer tab, prints the line number S and skips over the screen print in the next line.

Line 6090 reverses the order of the variable array, beginning with the value of Z when the loop ended. Line 6092 rejects zeroes and aborts the printing loop. If the array is exhausted, it increments tabulation and begins a new search at line 6030.

Lines 6094 through 6100 translate program tokens to ASCII codes for +, -, *, and /. The loop ends at line 6110. If P is not selected ($ is null), the loop is printed to screen. Note that if I$ is null, it will not print in lines 6104 and 6108. I$ in these lines is used for the H and G lines, 6050 through 6062.

In the second search routine, you will recognize many of the conditions used in the first search. If the number 137 (INPUT) is detected in line 6022, we go to line 6112. Lines 6112 through 6120 look for a quotation mark. If they find one, they search for the required semicolon. Otherwise, they jump to the array-filling loop at line 6122. At line 6124, we may be searching to the right of READ instead of INPUT. The analysis loop of the thirty numbers begins at line 6134 and ends at line 6144. Line 6136 is for JOYSTK (255,141).

Line 6138 assigns READ to I$. Line 6140 saves +, -, *, and /. Line 6142 detects tokens greater than 174 and exits. It also exits for PEEK statements (255,134). Lines 6026, 6028, and 6050 through 6062, are used to handle variables appearing in front of <, >, <=, >=, =< and => operators within IF...THEN...ELSE statements.

If you followed the discussion this far, congratulations! I hope you found the detailed description helpful in your study of programming. Happy programming!

Program Listing for Variable Listing

```
4999 REM**************************
5000 REM VARIABLE LISTING PROGRAM
5005 REM BY JOSEPH P. LARONDA
5010 REM SOUTHERN CONN ST. COLLEGE
5015 REM NEW HAVEN, CT 06515
5020 REM**************************
6000 CLEAR 500:X=25:CLS:DIMT(40)
```

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```
6ØØ2 INPUT"PRINTER P";A$:CLS
6ØØ4 IF A$="P" THEN PRINT#-2," "
6ØØ6 X=PEEK(X)*256+PEEK(X+1)
6ØØ8 S=PEEK(X+2)*256+PEEK(X+3)
6Ø1Ø IF S>=6ØØØ THEN 6184
6Ø12 IF PEEK(X+4)=13Ø OR PEEK(X+4)=58 O
R PEEK(X+4)=134 THEN 6ØØ6
6Ø14 A=PEEK(X+4)
6Ø16 IF A=ØTHEN X=X+5:GOTO 6ØØ8
6Ø18 IFA=34THEN6188
6Ø2Ø IF A=179 THEN H=PEEK(X+5):GOTO6Ø34
6Ø22 IF A=137 THEN 6112
6Ø24 IF A=141 THEN V=X-1:GOTO6124
6Ø26 IF A=18ØTHENG=A:GG=PEEK(X+5):GOTO6
Ø34
6Ø28 IF A=178THENG=A:GG=PEEK(X+5):GOTO6
Ø34
6Ø3Ø X=X+1
6Ø32 GOTO 6Ø14
6Ø34 V=X
6Ø36 FOR Y=1 TO 3Ø
6Ø38 T(Y)=PEEK(V+3)
6Ø4Ø V=V-1
6Ø42 NEXT Y
6Ø44 FOR Z=1 TO 3Ø
6Ø46 SS=T(Z+1)*256+T(Z):IF SS=S THEN T(
Z)=Ø:GOTO 6Ø84
6Ø48 IF T(Z)=32 THEN T(Z)=Ø:NEXT Z
6Ø5Ø IF H=178 THEN I$="=>":GOTO6Ø74
6Ø52 IF H=18Ø THEN I$="=<":GOTO6Ø74
6Ø54 IF G=18Ø AND GG=178 THEN I$="<>":G
OTO6Ø74
6Ø56 IF G=18Ø AND GG=179 THEN I$="<=":G
OTO6Ø74
6Ø58 IF G=18Ø THENI$="<":GOTO6Ø74
6Ø6Ø IF G=178 AND GG=179 THENI$=">=":X=
X+1:GOTO6Ø74
6Ø62 IF G=178 AND PEEK(X+3)<>18ØTHEN I$
=">":GOTO6Ø74:ELSE G=Ø
6Ø64 IF T(Z+2)=185 AND T(Z+1)=255 AND T
(Z)=131 THEN T(Z)=Ø:I$="DEFUSR":GOTO617
8
6Ø66 IF T(Z)=159THEN T(Z)=Ø:I$="TIMER":
GOTO6178
6Ø68 IFT(Z)=128ANDT(Z+1)<>255THENT(Z)=Ø
:I$="FOR":GOTO6178
6Ø7Ø IF T(Z)=2Ø4 THEN IF T(Z+1)=185 OR
T(Z+2)=185 THEN T(Z)=Ø:I$="DEFFN":GOTO6
178
6Ø72 IF T(Z)=132 AND T(Z+1)=255THEN6Ø3Ø
6Ø74 IF T(Z)>17Ø AND T(Z)<175 THEN NEXT
 Z
6Ø76 IF T(Z)=132 OR T(Z)=135 OR T(Z)=13
7 OR T(Z)=138 OR T(Z)=141 OR T(Z)=167 O
R T(Z)=168 OR T(Z)=176 OR T(Z)=177 THEN
 T(Z)=Ø:GOTO6Ø82
6Ø78 IF T(Z)>133 THEN H=Ø:G=Ø:GG=Ø:I$="
":GOTO6Ø3Ø
6Ø8Ø IF T(Z)=Ø OR T(Z)=58 THEN T(Z)=Ø:
GOTO 6Ø82:ELSE IF T(Z)>32 AND T(Z)<123
THEN NEXT Z:ELSE T(Z)=Ø
6Ø82 G=Ø:GG=Ø:H=Ø:IF T(Z-1)=4Ø AND T(1)
<>41 THEN T(Z-1)=Ø
6Ø84 IF A$="P" AND B>6Ø THEN B=Ø:PRINT#
-2,CHR$(13)
6Ø86 IF A$="P" THEN PRINT#-2,TAB(B)S;:G
OTO6Ø9Ø
6Ø88 PRINTS;
6Ø9Ø FOR W=Z TO 1 STEP -1
6Ø92 IF T(W)=Ø THEN NEXT W:B=B+2Ø:GOTO6
11Ø
6Ø94 IF T(W)=171THEN T(W)=43
6Ø96 IF T(W)=172 THEN T(W)=45
6Ø98 IF T(W)=173 THEN T(W)=42
61ØØ IF T(W)=174 THEN T(W)=47
61Ø2 IF A$="P" THEN PRINT#-2,CHR$(T(W))
;:NEXT W
61Ø4 IF A$="P" THENPRINT#-2,I$;:I$="":B
=B+2Ø:GOTO6Ø3Ø
61Ø6 PRINTCHR$(T(W));:NEXT W
61Ø8 PRINTI$;:I$=""
611Ø PRINT,:GOTO6Ø3Ø
```


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```
6112 IF PEEK(X+3)=255 THEN 6Ø3Ø
6114 IF PEEK(X+5)=34 OR PEEK(X+6)=34 TH
EN 6116:ELSE 6122
6116 A=PEEK(X+5)
6118 IF A=59 THEN X=X+1:GOTO6122
612Ø X=X+1:GOTO 6116
6122 V=X
6124 FOR Y=1 TO 3Ø
6126 T(Y)=PEEK(V+5)
6128 V=V+1
613Ø NEXT Y
6132 FOR Z=1 TO 3Ø
6134 IF T(Z)=32 THEN T(Z)=Ø:NEXT Z
6136 IF T(Z)=141 AND PEEK(X+3)=255 THEN
6Ø3Ø
6138 IF T(Z)=141 THEN T(Z)=Ø:I$="READ":
NEXT Z
614Ø IF T(Z)>17Ø AND T(Z)<175 THEN NEXT
 Z
6142 IF T(Z)>172 OR T(Z)=134 THEN6Ø3Ø
6144 IF T(Z)=Ø OR T(Z)=58 THEN T(Z)=Ø:G
OTO 6146:ELSE IF T(Z)>32 AND T(Z)<123 T
HEN NEXT Z:ELSE T(Z)=Ø
6146 IF I$="READ" THEN 6172
6148 IF A$="P" AND B>6Ø THEN B=Ø:PRINT#
-2,CHR$(13)
615Ø IF A$="P" THEN PRINT#-2,TAB(B)S;"I
NPT ";:GOTO6154
6152 PRINTS;"INPT ";
6154 FOR W=1 TO Z
6156 IF T(W)=Ø THEN NEXT W:B=B+2Ø:GOTO6
17Ø
6158 IF T(W)=171 THEN T(W)=43
616Ø IF T(W)=172 THEN T(W)=45
6162 IF T(W)=173 THEN T(W)=42
6164 IF T(W)=174 THEN T(W)=47
6166 IF A$="P" THEN PRINT#-2,CHR$(T(W))
;:NEXT W:B=B+2Ø:GOTO6Ø3Ø
6168 PRINTCHR$(T(W));:NEXT W
617Ø PRINT,:GOTO 6Ø3Ø
6172 IF A$="P" AND B>6Ø THEN B=Ø:PRINT#
-2,CHR$(13)
6174 IF A$="P" THEN PRINT#-2,TAB(B)S;I$
;" ";:I$="":GOTO6154
6176 PRINTS;I$;" ";:I$="":GOTO6154
6178 IF A$="P" AND B>6Ø THEN B=Ø:PRINT#
-2,CHR$(13)
618Ø IF A$="P" THEN PRINT#-2,TAB(B)S;I$
;" ";:I$="":GOTO6Ø9Ø
6182 PRINTS;I$;" ";:I$="":GOTO6Ø9Ø
6184 IF A$="P"THEN PRINT#-2,CHR$(17)
6186 SOUND 1ØØ,5Ø:END
6188 X=X+1
619Ø A=PEEK(X+4)
6192 IFA=34THEN6Ø3ØELSEIFA=ØTHENX=X+5:G
OTO6ØØ8
6194 GOTO6188 ■
```


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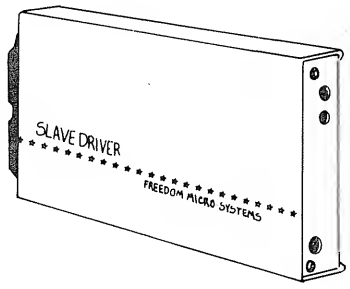

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Files and foibles

Two-level sorting: It's twice as good

Models I/II/III, PMC-80, LNW80

T. R. Dettmann, Associate editor

Just the other day someone asked, "Why can't I sort with Profile on two fields instead of just one?" Profile just wasn't designed to handle that kind of problem. That's true of most programs which deal with data files.

Most standard sorting packages, as well as magazine articles, have dealt with single-level sorting. No one seems to have discussed two-level sorting.

Is it that hard? Should we just go back and wait for someone to do it for us? Some packages do exist to do this, but on the whole most do not.

Multiple-level sorting isn't that hard, you just have to be careful to get your tests straight. The sample program included with this article allows you to build a simple random access file, scan it to make an index, sort the index, and then print it out in sorted order after a two-level sort.

For many businesses, a two-level sort is just short of essential to get the maximum benefit out of a package. For example, let's assume you have an inventory and want to make a list of parts, sorted by vendor.

With a single-level sort, the sort by vendor would leave the parts within a vendor in random order. This is kind of confusing if you have many parts from each vendor.

In order to have your vendor list ordered by, say, vendor part number, you need a technique that will order within each vendor as the sort is going on. The sample program does exactly that.

Still another problem that arises frequently when sorting is to take an existing file and make an index for it where none existed before. The sample program shows one approach to doing this.

Sorting — The Shell Sort

A reasonably quick method for sorting is known as the shell sort. This technique was devised because it was noted that while sorting, an item will often move quite a distance from its original location in the file. To try to take as few steps as possible, we step items through a gap that initially is half the size of the data file and decrease as we get closer to sorted order.

The basic sort has been published many times, including an appearance in Files and Foibles, however, we've changed the procedure. Line 3060 selects all records for which the last name is greater than or equal to the one a gap away.

After we've selected records we may swap, we first check for a last name only swap in line 3110. If the last names are out of order, we swap, and are done for the moment.

If the last names are the same, swap if the first names are out of order. Otherwise, just leave it as it is.

Model I, III and Color owners have to be careful in swapping strings. Simply swapping by reassigning the values of strings through an intermediary will lead to memory management in the computer's string space. For large arrays, this time can be considerable. You might want to consider simply reassigning the "VARPTR" pointers of the strings. See your manual for information at the VARPTR location.

The Program

This simple sort program is intended to illustrate the two processes noted above. First, building an index for a file that doesn't have one and secondly, sorting the index with a two-level sort.

Try adding some more information to the data records such as address, city, state, zip, phone number, or change it completely and see what a two-level sort can do for your application.

Figure 1
Unsorted File

```
DETTMANN                TERRY       PERSON  1
DETTMANN                MARY        PERSON  2
QWERTY                  PEABODY     PERSON  3
JOHNSON                 HARVEY      PERSON  4
JOHNSON                 HOWARD      PERSON  5
QWERTY                  PICKLES     PERSON  6
SCHMIDT                 MIKE        PERSON  7
BROWN                   CAM         PERSON  8
DETTMANN                LARRY       PERSON  9
DETTMANN                JERRY       PERSON  10
DETTMANN                MARY        PERSON  11
PRESS ENTER TO CONTINUE
```

Figure 2
File After a Two-Level Sort

```
BROWN                   CAM         PERSON  8
DETTMANN                JERRY       PERSON  10
DETTMANN                LARRY       PERSON  9
DETTMANN                MARY        PERSON  2
DETTMANN                MARY        PERSON  11
DETTMANN                TERRY       PERSON  1
JOHNSON                 HARVEY      PERSON  4
JOHNSON                 HOWARD      PERSON  5
QWERTY                  PEABODY     PERSON  3
QWERTY                  PICKLES     PERSON  6
SCHMIDT                 MIKE        PERSON  7
PRESS ENTER TO CONTINUE
```

Program Listing for Two-Level Sort

```
10 REM ********************************
20 REM
30 REM          2 LEVEL SORT DEMO
40 REM (C) 1982 BY TERRY R. DETTMANN
71 REM NOTE: ONLY LINES NUMBERED IN
72 REM INTERVALS OF 10 ARE NEEDED IN
73 REM THIS PROGRAM. LINES NOT A
74 REM MULTIPLE OF 10 MAY BE LEFT OUT.
80 REM
90 REM ********************************
95 REM          SETUP STRING SPACE AND
MAKE ALL VARIABLES INTEGERS
100 CLEAR10000:DEFINTA-Z
105 REM          GET THE DATA FILE
110 OPEN"R",1,"DATA/DAT"
120 FIELD1,30 AS LN$,15 AS FS$,30 AS DT
$
125 REM          IX WILL BE THE INDEX OF
 FILE LOCATIONS
126 REM          IX$ WILL BE THE INDEX O
F LAST & FIRST NAMES
127 REM          500 WILL BE A FUNDAMENT
AL LIMIT ON THE NUMBER OF ITEMS
128 REM          IN THE FILE
130 DIM IX(500),IX$(500,2):CL=80:RW=24
135 REM          DEFINE FUNCTIONS FOR HE
ADING LINE AND CENTERING
140 DEFFNHDR$(X$)=STRING$((CL-2-LEN(X$)
)/2,"-")+" "+X$+" "+STRING$((CL-3-LEN(X
$))/2,"-")
150 DEF FNCTR$(X$)=STRING$((CL-LEN(X$))
/2," ")+X$
200 REM - - - - - - - - - - - MENU - -
- - - - - - - - - - - - - - - - -
210 CLS:PRINTFNHDR$("MENU"):PRINT:PRINT
:PRINT:PRINT
220 PRINTTAB(20)"0.  END":PRINT
230 PRINTTAB(20)"1.  ENTER DATA":PRINT
240 PRINTTAB(20)"2.  FORM INDEX AND PRI
NT":PRINT
250 PRINT:PRINT:PRINT
260 PRINTTAB(20)"SELECTION";:INPUTS
270 IF S=0 THEN CLS:PRINTFNHDR$("SAVING
 INDEX"):CLS:N=LOF(1):CLOSE:GOSUB1000:E
ND
280 ON S GOSUB 5000,6000
290 GOTO200
1000 REM - - - - - - - - - - SAVE INDEX
 - - - - - - - - - - - - - - - - -
1005 REM          MAY NEED THE INDEX FOR
LATER PROCESSING
1010 OPEN"O",1,"DATA/IDX"
1020 FORI=1TON:PRINT#1,IX(I):NEXTI
1030 CLOSE:RETURN
2000 REM - - - - - - - - - - ALWAYS PUT
```


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```
 DATA AT END OF FILE - - - - - - -
2005 REM        SIMPLE DATA SAVE ROUTIN
E  FOR THIS PROGRAM
2010 RN=LOF(1)+1
2020 LSETLN$=L$:LSETFS$=F$:LSETDT$=D$
2030 PUT1,RN
2040 RETURN
2100 REM - - - - - - - - - - - GET A RECO
RD - - - - - - - - - - - - - - - -
2105 REM        MUST ERROR CHECK SO WE
DON'T GET A BAD RECORD NUMBER
2110 IF RN>LOF(1) THEN PRINT"ERROR - RE
CORD NOT IN FILE":RETURN
2120 GET1,RN
2130 L$=LN$:F$=FS$:D$=DT$
2140 RETURN
3000 REM - - - - - - - - - - 2 LEVEL SORT
 - - - - - - - - - - - - - - - -
3005 REM        GP IS THE COMPARISON GA
P
3006 REM        WE'LL COMPARE ITEMS WIT
H A GAP BETWEEN THEM TO SPEED UP
3007 REM        THEIR MOVEMENT
3010 GP=LOF(1)
3015 REM        IF THE GAP GETS DOWN TO
 1, THEN WE'RE DONE
3020 IF GP<=1 THEN RETURN
3025 REM        DIVIDE THE GAP BY 2 EAC
H TIME THROUGH
3030    GP=INT(GP/2)
3035 REM        FG IS THE FLAG WHICH WI
LL BE 1 WHENEVER WE EXCHANGE ITEMS
3040    FG=0
3045 REM        MAKE ALL POSSIBLE COMPA
RISONS AT A SEPERATION OF GP
3050    FORI=1TOLOF(1)-GP
3060       IF IX$(I,1)>=IX$(I+GP,1) THE
N GOSUB3100
3070    NEXTI
3075 REM        IF THERE WAS AN EXCHANG
E, THEN CYCLE THROUGH AGAIN,
3076 REM        OTHERWISE CHECK TO SEE
IF THE GAP IS 1
3080    IF FG=1 THEN 3040 ELSE 3020
3100 REM - - - - - - - - CHECK FOR POSS
IBLE SWAP - - - - - - - - - - -
3105 REM        IF EITHER THE LAST NAME
S ARE OUT OF ORDER OR THE FIRST ARE
3106 REM        THEN EXCHANGE THE ITEMS
3110 IF IX$(I,1)>IX$(I+GP,1) THEN GOSUB
3200 ELSE IF IX$(I,2)>IX$(I+GP,2) THEN
GOSUB3200
3120 RETURN
3200 REM - - - - - - - SWAP THE ITEMS -
```


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```
- - - - - - - - - - - - - - - - -
3205 REM        SWAP IS A MODEL II FUNC
TION
3206 REM        MODEL I,III,& COLOR SWA
P BY SETTING AN INTERMEDIATE
3207 REM        VARIABLE LIKE THIS:
3208 REM        L=IX(I):IX(I)=IX(I+GP):
IX(I+GP)=L
3210 SWAP IX$(I,1),IX$(I+GP,1)
3220 SWAP IX$(I,2),IX$(I+GP,2)
3230 SWAP IX(I),IX(I+GP)
3235 REM        SET THE FLAG TO INDICAT
E A SWAP TOOK PLACE
3240 FG=1
3250 RETURN
5000 REM - - - - - - - - - - ENTER DATA
 INTO THE FILE - - - - - - - - - -
5010 CLS:PRINTFNHDR$("ENTER DATA"):PRIN
T:PRINT:PRINT
5020 LINE INPUT"LAST NAME (END WHEN DON
E) ===> ";L$:IF L$="END" THEN RETURN
5030 LINE INPUT"FIRST NAME ==========
=======> ";F$
5040 LINE INPUT"DATA ABOUT THE PERSON =
=======> ";D$
5050 PRINT:GOSUB2000:GOTO5020
6000 REM - - - - - - - - - - READ FILE
AND SORT INDEX - - - - - - - - - -
6010 CLS:PRINTFNHDR$("CREATE INDEX FOR
FILE"):PRINT:PRINT:PRINT
6020 PRINTFNCTR$("SCANNING FILE")
6030 FOR I=1 TO LOF(1)
6040    RN=I:GOSUB2100
6045 REM        BUILD AN INDEX RECORD F
OR RECORD I
6050    IX$(I,1) = L$:IX$(I,2) = F$:IX(
I)=I
6060 NEXTI
6070 PRINTFNCTR$("SORTING FILE")
6080 GOSUB3000
6090 CLS:PRINTFNHDR$("SORTED ORDER FILE
"):PRINT:PRINT
6100 FORI=1TOLOF(1)
6105 REM        GET THE NEXT RECORD IN
SORTED ORDER ACCORDING TO THE
6106 REM        INDEX FILE IX(I)
6110    RN = IX(I):GOSUB2100
6120    PRINTL$;F$;D$
6130 NEXTI
6135 REM        AN EASY WAY TO STOP FOR
 THE OPERATOR
6140 LINEINPUT"PRESS ENTER TO CONTINUE"
;X$
6150 RETURN ■
```


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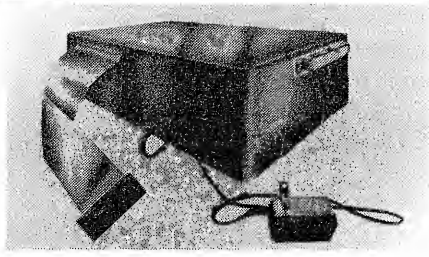

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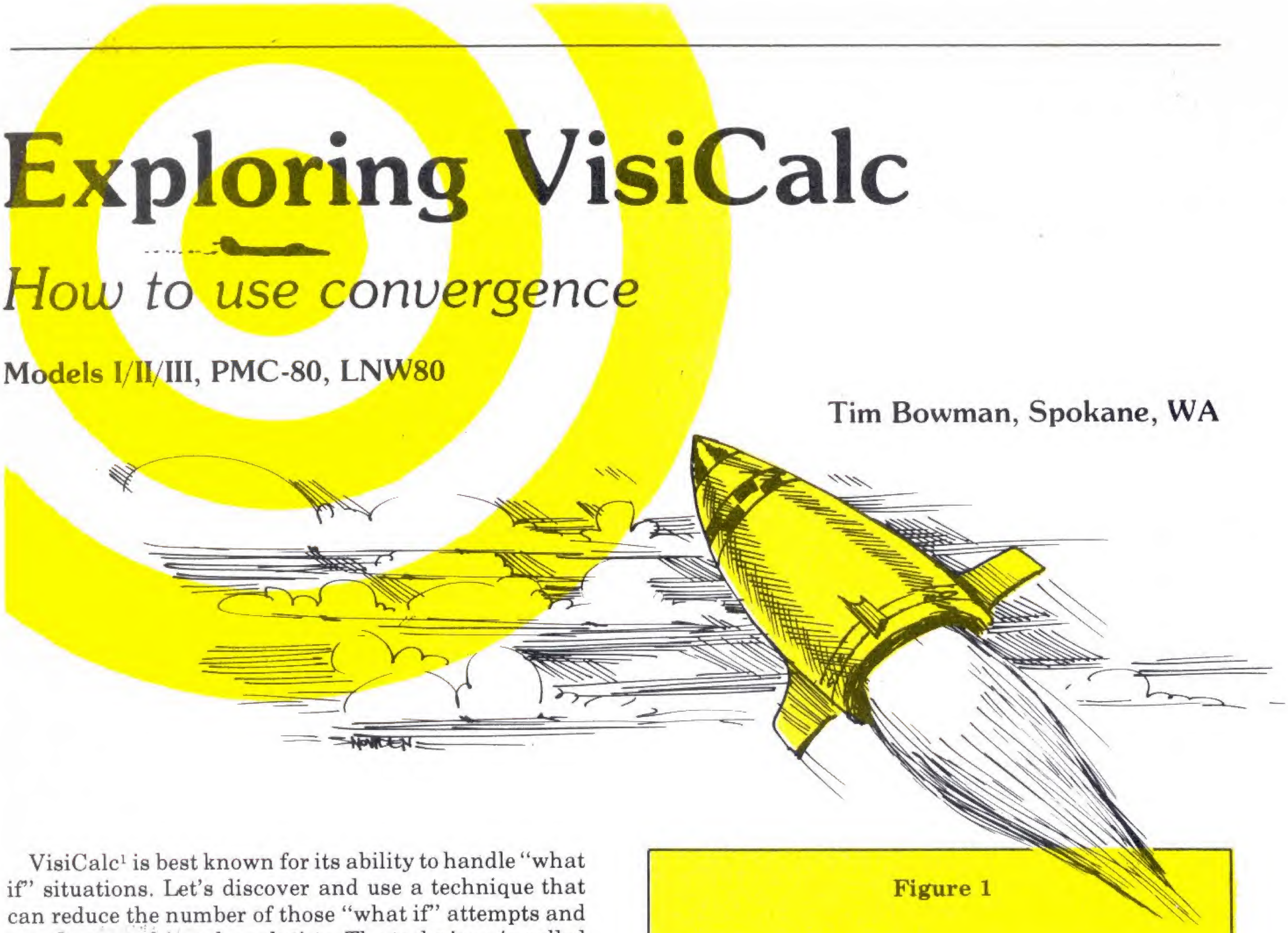
Exploring VisiCalc

How to use convergence

Models I/II/III, PMC-80, LNW80

Tim Bowman, Spokane, WA



VisiCalc[1] is best known for its ability to handle "what if" situations. Let's discover and use a technique that can reduce the number of those "what if" attempts and speed up reaching the solution. The technique is called convergence. Convergence is simply the process of reaching a solution by using a number of trial and error attempts that finally reach or converge upon the answer. It might also be pictured as a missile homing in on a target.

Internal Rate-of-Return

To demonstrate the power of this technique, we will first use VisiCalc to perform some calculations in a manual way. To do this we'll use a simple internal rate-of-calculation problem. The internal rate-of-return is the interest rate at which the net present value, of a series of outflows and inflows over time, is equal to zero. If that sounds too complicated, consider this example. A business manager will invest $5000 at the beginning of year one which will yield that person returns of $1000, $1500, $2500, $2000 and $1000 at the end of years one through five, respectively. The internal rate-of-return is the rate at which the negative cash flow ($5000) and the present values of the positive cash flows at the end of years one through five equal zero. Although you still might not be convinced of the value of the concept, rest assured that it is a widely used method to decide whether or not to invest in a given project.

A Manual Approach

Load in your VisiCalc program. Type /CY to clear the screen. With the cursor at position B1, type in the following:

>B1 1 rightarrow 1+ leftarrow ENTER.

Figure 1

Cursor Pos.	Entry
	/GRM ENTER
	/GOC ENTER
B3	"Guess ENTER >A14
A14	+A2+@NPV(C13,B2.F2) DOWNARROW
A15	+A3+(.001) DOWNARROW
A16	+A2+@NPV(A15,B2.F2) DOWNARROW
A17	+A3+(.001*(A14/(A14-A16))) DOWNARROW
A18	+A2+@NPV(A17,B2.F2) DOWNARROW
A19	+A17+(.001) DOWNARROW
A20	+A2+@NPV(A19,B2.F2) DOWNARROW
A21	+A17+(.001*(A18/(A18-A20))) ENTER >C14
	ENTER
C14	+A2+@NPV(A21,B2.F2) DOWNARROW
C15	+A21+(.001) DOWNARROW
C16	+A2+@NPV(C15,B2.F2) DOWNARROW
C17	+A21+(.001*(C14-C16)) DOWNARROW
C18	+A2+@NPV(C17,B2.F2) DOWNARROW
C19	+C17+(.001) DOWNARROW
C20	+A2+@NPV(C19,B2.F2) DOWNARROW
C21	+C17+(.001*(A18/(C18-C20))) ENTER >E4
	ENTER
E4	+C21*100 DOWNARROW
E5	/FR@ABS(+C21-A21)<=,00001
	DOWNARROW
E6	"Internal DOWNARROW
E7	"Rate of DOWNARROW
E8	"Return ENTER

/R ENTER rightarrow D1.F1 ENTER R

>A2 ENTER

-5000 rightarrow 1000 rightarrow 1500 rightarrow 2500 rightarrow 2000 rightarrow 1000 ENTER

>A3 ENTER

.15 downarrow

+A2+@NPV(A3,B2.F2) ENTER

After a slight pause you should see the value 288.2545 at position A4. Try higher and lower rates at A3 until you get the value at A4 to approach zero. When it does your internal rate of return should be about .1728674256 (assuming you want your answer accurate to eleven places!). Although this method works, the operator must input each of those successive tries. Is there an easier approach? That's where convergence fits in.

If you want to save the above screen before we solve the problem using convergence, do so now. Then delete lines three and four by positioning the cursor on each of the lines and typing /DR. You should be left with only the column headings and the cash flow entries on lines one and two.

Using Convergence

Now type in the lines shown in the entry column in Figure 1. The location of each entry is shown in the cursor position column. Be sure to insert the spaces after any quotes to properly space the column headings. The quote and plus symbol are given to clarify that the entry is either a label or value and may be omitted during typing in certain situations. The cursor key controls (downarrow, rightarrow and ENTER) are spelled out and the appropriate key should be pressed. Those of you who are familiar with the replicate feature may wish to use it to reduce the typing. The semicolon and the information to its right gives an explanation of the line and is not to be typed.

When you have typed in the information from Listing 1, type /GRA which will turn on the automatic recalculation feature. To test the routine, type >A1 and >A3 to position the screen and the cursor. Type in a value of .15 and press ENTER. There will be a slight pause and you will see the true internal rate-of-return at position E4. Position E5 will show the word, "TRUE." Try increasing and then decreasing the size of your guess until the word FALSE appears on line E5. You can see that your guess has to be off by a large amount to produce the word FALSE. With practice you can generally guess the approximate internal rate of return, and this method actually gives quite a bit of tolerance.

How It Works

The keys to the convergence routine are found at positions A17, A21, C17 and C21. These formulas build upon the initial guess and succeeding tries. They add or subtract an adjustment factor (.001*A14/(A14-A16)) which, for example, is found at position A17. It does not matter if your guess is higher or lower than the true internal rate-of-return, the program tries to "home-in" on the true answer.

By studying Figure 1, I hope that you will gain an understanding of how convergence can reduce the number of user inputs to solve VisiCalc problems. I developed this convergence technique for a very long VisiCalc program which calculates the true Annual Percentage Rate on loan transactions. Other possible uses include other complex mathematical calculations that require trial and error attempts, creation of income statements and balance sheets that require a number of attempts to determine a specific value such as an ending cash balance.

Some of you may be wondering why I started the calculations at A14. I prepare most of my programs to be used by others who may not be aware of or care how the program works, so I generally position the calculation portion of the program so that it does not appear on the viewer's screen.

That's all for this month. ■

[1] *The VisiCalc program is copyrighted by VISICORP and VisiCalc is a registered trademark of VISICORP.*

Ed. note: Correspondence for Mr. Bowman should be addressed to: Mr. Tim Bowman, c/o 80-U.S. Journal, 3838 S. Warner St., Tacoma, WA 98409. Be sure to include a SASE if you desire written response.

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Based on notes and observations by John Strader, CPA

In our two previous issues, we covered General Ledger, Accounts Payable, Accounts Receivable and Fixed Asset programs. In this final article, we will review the Payroll and Easytrak programs.

The Plus Computer Technology Payroll program is one of the most complete and detailed we have seen in a microcomputer application. It even allows for an automatic shift differential pay for each employee. The only potential problem we could see was in workman's compensation insurance. There was apparently no way to deduct and account for the insurance on an hourly basis. Most states use a percentage of gross wages. In some states it is based on hours.

The system-support agreement includes update notices on all federal income and social security tax changes. The payroll programs will handle from 200 to 600 employees when used with two drives on a TRS-80 Model III with 48K. As explained in earlier installments on this accounting system, the payroll may be posted automatically to the General Ledger. It may also be posted by hand, if desired. The Payroll program has the following features: Handles payroll weekly, biweekly, semimonthly or monthly; allows fixed and one-time deductions; handles hourly or salaried employees, updates tax tables easily; processes all government forms including Form 941 and W-2. It will also process checks, check registers, employee earning reports, departmental labor reports and deduction registers. The system will aid in reconciling your bank statement, track and record vacation, sick leave and holiday pay; it provides a departmental labor report which handles multiple departments for a single employee.

Useful reports include a payroll edit register, payroll register, payroll checks, check register, master file lists, Form 941, Form W-2, terminated employees, miscellaneous deduction register, employee master file, vacation, holiday and sick day registers.

Of course, there are complete reports for state and local tax as well as departmental labor, union dues, workman compensation worksheets, unemployment tax worksheets, and reconcile/unreconcile check schedules.

Easytrak

The last module in the Plus Computer Technology accounting package is called Easytrak. With it, you can monitor sales activity with your computer.

This is a very flexible program which allows you to input your own report and file information. It can be used for a variety of purposes. Some of the uses are listed in the manual as project reporting, expense analysis, variance analysis, absenteeism analysis and subscription analysis. It could also be used as a production reporting system (items manufactured, items shipped, etc.).

The Easytrak program will support 1400 to 3600 records with two disks, in a 48K TRS-80 Model III. This is the only program in the complete package which does not post automatically to the General Ledger.

It allows you to track sales activity by product line, salespeople, territories, customers, or any combination of these items. You may use it for inquiries, orders, sales calls, or invoices. The activity period can be followed by day, week, month, or year.

Typical sales analysis reports generated by Easytrak are territory/product, product/territory, customer/product, customer/territory, salesperson performance and group comparisons.

Our overall impression of the five program packages reviewed is that they will provide the small and medium business with a viable set of interactive programs at a reasonable price. The company does provide extended support (at a reasonable cost), which seems to be mandatory with higher-level programs such as these. Some time will be necessary to "get into" these programs, but such time is usually well spent. Once understood, the system will provide what it promises. The documentation for each package is well done and easy to follow. An excellent system, but you must be aware of accounting principles and have an idea of your objectives before you delve in. ■

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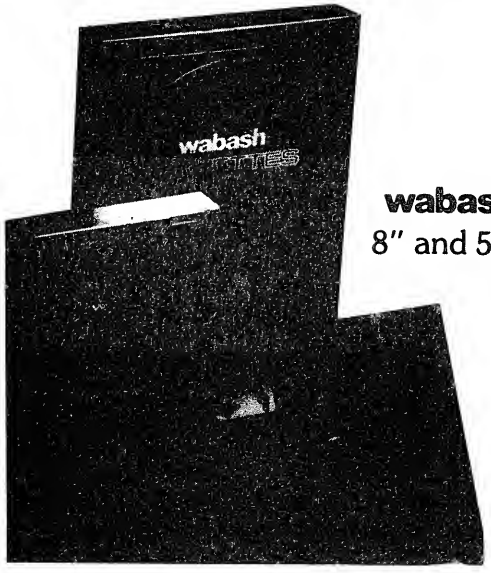

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BASIC Bits

Troubleshooting your problems and string handling techniques

Models I/III, PMC-80, LNW80

Tom Quindry, Burke, VA

Not everyone realizes the power of using string functions in Level II BASIC games. String functions do not have to be confined to alphanumeric characters, but can also include the Level II control codes which do everything but clean the kitchen sink. These codes can backspace, linefeed, clear part of the screen, turn on graphic characters, etc.

Instead of POKEing graphics on the screen, which is slow, set up string functions to turn on a series of lights. Combine them with linefeeds and backspace codes to create a graphic block which is more than one line high. As an illustration, try the program in Listing 1. In this example, all of the numbers given in the data statements are converted to CHR$ functions which are concatenated into strings. They are graphic and control codes. The control codes used are given in your Model I or III Level II manual in Appendix C. The control codes used are: 26 - to move the cursor down, and 24 - to backspace without erasing. In this example, the graphic figure is four characters wide. Thus, by moving the cursor down with the 26 code and then backspacing four times with the 24 code, the next line of graphic characters for the figure will be positioned correctly within the same string variable. Also note that both the A$ and B$ strings are exactly the same length, i.e., four characters wide and four characters high. Each string is large enough so that the graphic figure created by it completely overwrites the previous string displayed. Thus, motion is created by printing one string variable directly over the other.

Here is an easy way to determine the proper graphic code for each graphics byte. Each graphic byte consists of six segments or areas that can be turned on or off like lights. In order to determine the codes to light up any of the six bytes, start with the base value of 128. This value is the code for all lights off. Without going into much explanation, use the following visual aid:

POKE Video, 128+ $\begin{matrix} 1 & 2 \\ 4 & 8 \\ 16 & 32 \end{matrix}$ to determine the graphic code.

You add the numbers of the blocks you want lit to 128. For example, POKEing the value 153 (128 + 1 + 8 + 16) into a graphic byte gives:

#	b
b	#
#	b

where the b's stand for blanks and the #s stand for the light on.

Notice on line 20 in Listing 1, the command CLEAR 93. This is one and one-half times the amount of string space needed for A$ and B$ combined. Why is this necessary? Your computer must go through a garbage collection exercise and needs the extra space to sort things out. After redefining a string variable, the computer does not simply overwrite the present string with the new information. It writes it in a new location of reserved string space. The reserved string space is determined from the CLEAR 93 command. In this case ninety-three spaces have been reserved for string data. When the ninety-three spaces come close to being filled, the computer interrupts your BASIC program and resorts the data. It gets rid of old unused information and resorts the new information to clear space for the next string input. This is one of the reasons for what is called "Silent Death" in a program that uses numerous string variables taking thousands of bytes. Long pauses may occur during this garbage collection, maybe even minutes. This occurs mostly in BASIC programs, such as a mail list program, where updating of the string stack area is frequent. Any time you do a BASIC sort of string data you run into this. That is why it is better to go to some type of machine language sorting process.

Listing 2 demonstrates the string handling routine of the TRS-80. The short machine language routine that is POKEd into memory displays the reserved string space area at the top of the video screen. In this case the string space is fifty bytes determined by CLEAR 50. As you will see, the string space fills up from right to left. When there is no more room for a new variable, the garbage collection routine takes over and moves the currently active string variable values to the right. If you are changing the value of a previously defined string, both

the previous and current value remain in memory after the garbage collection routine works on that variable. But only the current value is active.

My computer club newsletter gave a tip for loading a system program when you can't remember the name of it. It was to run a one-line program:

```
10 INPUT#-1, A$: PRINT MID$(A$,2,6)
```

This program displays the name of the system program so that you can then run it. Using my Model III computer, I was able to read the program name for programs saved at 500-baud but not at 1500-baud. What am I doing wrong?

R. W., Burke, VA

Answer: You are not really doing anything wrong. What you have failed to realize is that on the Model III, DATA INPUTs from tape are saved and loaded at 500-baud, regardless of the cassette speed you have set for regular tape loads. You can't use this tip for system tapes saved at 1500-baud. Listing 3 is a short routine that I developed to load unnamed system tapes. It will work on both the Model I and the Model III computer. It POKEs a machine language program into memory which reads the SYNC byte leader. Then, after that is done, it bypasses the name recognition sequence of code in the system-loading routine and loads the program. You still won't know what the name of your system program is, but after you load and run it, you will probably remember it. You must set the cassette speed, high or low, before using it with the Model III. It doesn't matter where this routine is loaded into memory. Its job is done before any system tape can overwrite the memory where it resides.

Question: I have trouble remembering how to POKE the address for a USR function into memory for a machine language subroutine. Can you give me some pointers?

J. R., Rockville, MD

Answer: One of the hardest things for beginners to grasp is the reverse order of bytes when specifying a two-byte address. In the Level II Radio Shack manual, it tells you POKE 16526, (low byte): POKE 16527, (high byte): X=USR(0) to call a machine language subroutine. The real trick is in how to compute that low byte and high byte. Let's see how.

First, you convert the decimal address to its hexidecimal equivalent. Then split it into its high and low bytes, change the high and low bytes back to their decimal equivalents, and last, POKE them into the above addresses. This can be done by: 1) taking the integer part of the address divided by 256 for the high byte, and 2) setting the low byte equal to the address minus 256 times the high byte. See Listing 3, lines 100 and 110 for an example of this. Hmmmm, which one takes the high byte and which the low? Well, I've thought of a way to let your computer do the work for you. Suppose you wish to access a machine language subroutine that starts at 32000. Try this in your BASIC program:

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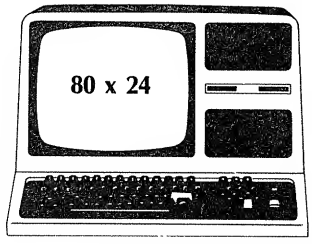

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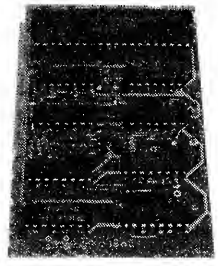

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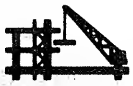

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BASIC Bits

```
100 A%=32000: N=VARPTR(A%)

110 POKE 16526, PEEK (N): POKE 16527, PEEK (N+1)

120 X=USR(Y)
```

What we've done is let the computer calculate and store the two integer bytes in A%. Then we look at them to see what they are, using the VARPTR function to locate them, and the PEEK function to see them. I've purposely left N, X and Y as single-precision variables in the above example to emphasize that the only important integer variable is A%. In the above example, A% must be an integer to provide the proper code format for the PEEK commands. The other variables can be single precision, double precision or integer. You will save space by making them integers and perhaps your program will run faster. For addresses greater than 32767, subtract 65536 from it to get the correct address value otherwise you will get an overflow error.

Ed. note: Correspondence for Mr. Quindry should be sent to: Mr. Tom Quindry, c/o 80-U.S. Journal, 3838 So. Warner St., Tacoma, WA 98409. Please enclose a SASE for a reply. Problems of general interest may be included in futre BASIC Bits.

Listing 1

```
1 REM BASIC BITS #2 LISTING NO. 1
5 REM ANIMATE - BY THOMAS L. QUINDRY
10 REM AN EXAMPLE OF ANIMATED GRAPHIC S
  TRING CHARACTERS
20 CLEAR 93
30 CLS
40 PRINT@256, "THIS IS AN ANIMATION OF
  MEN JUMPING"
50 FOR N=1 TO 31
60 READ A
70 A$=A$+CHR$(A)
80 NEXT A
90 FOR N=1 TO 31
100 READ B
110 B$=B$+CHR$(B)
120 NEXT B
130 PRINT@ 450,A$;
140 PRINT@ 455,A$;
150 PRINT@ 460,A$;
160 PRINT@ 465,B$;
170 PRINT@ 470,A$;
180 PRINT@ 475,A$;
190 FOR N=1 TO 100
200 NEXT
210 PRINT@ 450,B$;
220 PRINT@ 455,B$;
230 PRINT@ 460,B$;
240 PRINT@ 465,A$;
250 PRINT@ 470,B$;
260 PRINT@ 475,B$;
```


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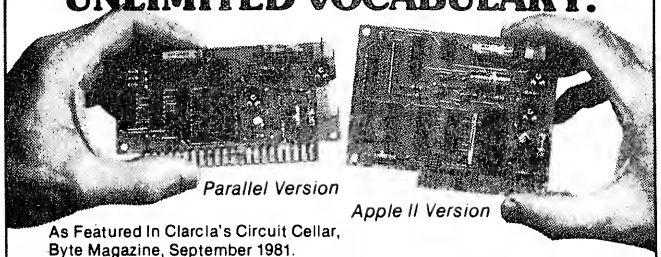

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```
270 FOR N=1 TO 100
280 NEXT N
290 GOT 130
300 DATA128,176,144,128,26,24,24,24,24
310 DATA180,187,177,148,26,24,24,24,24
320 DATA128,159,149,128,26,24,24,24,24
330 DATA130,129,131,128
340 DATA128,175,133,128,26,24,24,24,24
350 DATA135,191,151,133,26,24,24,24,24
360 DATA128,149,149,128,26,24,24,24,24
370 DATA128,128,128,128
```

Listing 2

```
1 REM BASIC BITS #2 LISTING NO. 2
5 REM STRING SPACE GARBAGE COLLECTION E
  XAMPLE
10 REM 16544 AND 16545 - POINTER TO STA
  RT OF STRING SPACE
20 CLEAR 50
30 CLS
40 B=PEEK(16544)+256*PEEK(16545)+1
50 A=B-INT(B/256)*256:B=INT(B/256)
60 60 DATA 33,0,0,17,0,60,1,50,0,237,17
  6,201
70 FOR N=32000 TO 32011
80 READ C
90 POKE N,C
100 NEXT N
110 POKE 32001,A: POKE 32002,B
120 ON ERROR GOTO 190
130 DEFUSR=32000
140 ON ERROR GOTO 0
150 PRINT@500,:INPUT"A$ = ";A$:X=USR(0)

160 PRINT@500,:INPUT"B$ = ";B$:X=USR(0)

170 PRINT@500,:INPUT"C$ = ";C$:X=USR(0)

180 GOTO 150
190 POKE 16526,0: POKE 16527,125
200 RESUME 140
```

Listing 3

```
1 REM BASIC BITS #2 LISTING NO. 3
5 REM TO LOAD UNNAMED SYSTEMS TAPES
10 FOR N=32000 TO 32008
20 READ A:POKEN,A: NEXT N
30 ON ERROR GOTO 90
40 DEFUSR=32000
50 ON ERROR GOTO 0
60 DATA 49,136,66,205,147,2,195,231,2
70 X=USR(0)
80 END
90 POKE16526,32000-INT(32000/256)*256
100 POKE16527,INT(32000/256)
110 RESUME 50 ■
```


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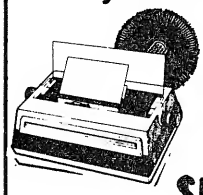
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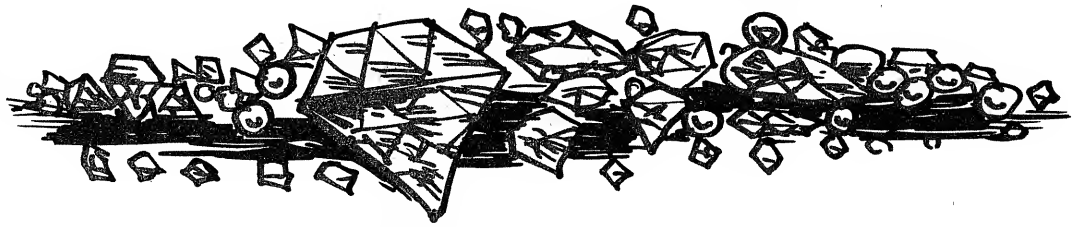
Two tips and a treat —

Three gems from the creator of Z-Subs

Models I/III, PMC-80, LNW80

Spencer Hall, Associate editor



The tips in this Thanksgiving offering are for people who are now programming in BASIC or would like to. If you're not into programming, they're still fun to play with and won't cost you much time to peck in. The treat takes a little, but not much, more effort. Make this effort and I promise that your mental picture of a BASIC program resident in your computer will never be the same again. Better yet, with it you can pack a string even if you never wrote a line of BASIC. Everything is for any size Model I, Level II and some run on Model III. Models II and 16 will run one of the tricks, but not the treat. There is even a Color Computer conversion for Listing 1.

Fire up and load Listing 1. I'll wait for you:

Program Listing 1 for
Nested Loops with Process Monitor

```
5 ' -- LINE 30 LOADS SIX 1-PIXEL GRAPHI
CS --
    -- BLOCKS PROGRESSIVELY INTO AN ARR
AY --
10 CLS:DEFINT A,B,N,X:A=1
20 DATA 129,130,136,160,144,132
30 FOR J=1 TO 6:READ B:N(J)=B:NEXT
40 GOTO 90
45 ' -- SUBR: SHOW NEXT BLOCK IN ARRAY
--
50 X=X+1:IF X=7 THEN X=1
60 PRINT@ 63,CHR$(N(X)):RETURN
65 ' -- SUBR: SHOW CUE AND PAUSE --
     -- UNTIL ANY KEY IS HIT --
70 PRINT@ 981,"TO PROCEED HIT ANY KEY"
75 ' -- USED AFTER DIFFERENT CUE IN #10
0 --
80 Z$=INKEY$:IF Z$="" THEN 80 ELSE RETU
RN
85 ' -- ACTION STARTS HERE! --
90 CLS:INPUT "RUN LOOPS A - B - C THRU
HOW MANY ITERATIONS";N
100 PRINT:PRINT "LOOP STARTS ON NEXT KE
YSTROKE":GOSUB 80
110 CLS:FOR A=1 TO N:FOR B=1 TO N:FOR C
=1 TO N
120 PRINT@ 468," A ="A;"  B ="B;"  C ="
C
125 ' -- CALLING NEXT PIXEL DISPLAY --
130 GOSUB 50
135 ' -- "NEXT:NEXT:NEXT" ALSO WORKS! -
-
140 NEXT C:NEXT B: NEXT A
150 PRINT@ 468,CHR$(218)
160 PRINT@ 478,"DONE"
170 GOSUB 70:GOTO 90
```

Run your program and ask for at least five iterations, or ten if you have a speed-up kit operating, so that you have time to see what is going on. You'll be kept up-to-date on where in each of three nested loops the program is currently working. That's all the loops have to do . . . that and the little whirling pixel in the upper right of the screen. That's our tip, or one of them.

Line 130, inside all of the loops, requests one pixel each time around. The subroutine in lines 50 and 60 prints each graphics block in rotation from matrix N(J), which is created in line 30 from DATA in line 20. These numbers are ASCII codes for graphics blocks which contain one pixel each, located progressively clockwise around the character image. Line 50 "closes the loop" when necessary by pointing once more to the first number in the matrix. Use this in any program, when a big loop is in progress, to reassure the viewer that the computer hasn't wandered off into the blue and hung itself.

The program loops (and you) must BREAK to escape. Use the loop feature to run successively more iterations. The time goes up by the cube of the number you choose. That's exactly why the whirling pixel is so comforting!

Before you move on, record this, if you like, so the resident copy is expendable, and I'll show you another

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tip. An alternate way of closing the loops in line 140 is to write: NEXT C,B,A. If the three letters were not consecutive in the alphabet, reversing their order from that in the FOR statements could be a bit confusing.

Why bother? Microsoft BASIC doesn't need to be told which follows which. It knows! Rewrite line 140 to read simply: NEXT:NEXT:NEXT. Works, doesn't it? Time a long loop with your electronic wristwatch and you'll detect a small time saving. Why don't the pros use this shortcut more? Answer: They learned their trade in a more primitive BASIC!

Now, if you have Model I with the lowercase modification, start typing in Listing 2. I'll show you how you can throw away that upper-lowercase BASIC driver when you write your own programs.

Program Listing 2 for Lower Case without a Driver

```
Ø CLEAR 5ØØ:GOTO1ØØ
7 FOR ZZ=1 TO 25Ø*ZS:NEXT ZZ:RETURN
9 Z$=INKEY$:IFZ$=""THEN 9 ELSE ZZ=VAL(Z
$):RETURN
18 PRINT@981,"TO PROCEED HIT ANY KEY";:
GOTO 9
69 '-- ACCEPT U/L CASE INPUT, ZZ$ --
7Ø ZZ$="":GOSUB82:IF ZZ=Ø THEN ZZ=255
71 POKE ZM,143
72 Z$=INKEY$:IF Z$="" THEN 72 ELSE Z=AS
C(Z$) '--- INPUT ---
73 IF Z>31 AND Z<>24 THEN 78'- IF IT'S
A CHARACTER, PROCESS IT
74 IF Z=8 AND ZZ$="" THEN 72'-- NO INPU
T, THEN NO BACKSPACE
75 IF Z=8 ZZ$=LEFT$(ZZ$,LEN(ZZ$)-1):POK
E ZM,32:ZM=ZM-1:GOTO 71
76 IF Z=24 THEN FOR J=ZM TO Z1 STEP -1:
POKE J,32:ZM=ZM-1:NEXT:ZZ$="":GOTO 71
77 IF Z=13 POKE ZM,32:ZZ=Ø:RETURN  '--
<CR> ENDS INPUT --
78 IF LEN(ZZ$)=ZZ THEN 72'--REFUSE INPU
T AFTER ZZ CHARACTERS
79 IF Z<91 AND Z>64 THEN Z=Z+32:Z$=CHR$
(Z):GOTO81
8Ø IF Z>96 THEN Z=Z-32:Z$=CHR$(Z)
81 ZZ$=ZZ$+Z$:POKE ZM,Z:ZM=ZM+1:GOTO 71
82 ZM=PEEK(16416)+256*PEEK(16417):Z1=ZM
+1:RETURN
84 '--- PRINT U/L CASE ENCODED STRING,
ZZ$ ---
85 GOSUB 82:FOR J=1 TO LEN(ZZ$):POKE ZM
,ASC(MID$(ZZ$,J,1)):ZM=ZM+1:NEXT:RETURN
1ØØ CLS:PRINT@ 468,;
11Ø ZZ$="Lower Case Demonstration"
12Ø GOSUB 85:ZS=2:GOSUB 7
13Ø CLS:PRINT "TYPE YOUR MESSAGE:"
14Ø PRINT@ 328,;:GOSUB7Ø
15Ø CLS:PRINT "YOU JUST WROTE: ";:GOSUB
 85
16Ø GOSUB 18:GOTO 1ØØ
```

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As you type the string in quotes in line 110, don't hold the shift key down when you type the capitals, but *do* keep it down when you type the lower case letters. If you got the code right, you have a short program which lets you type in upper/lower case on the screen and when you press enter, it shows you what you wrote at a place of its own choosing. The subroutine at lines 70 through 81, with its RETURN at line 77 (not to be confused with the one-liner at 82), is what does this. It's complete with backspace (line 75), a backspace stopper, if you haven't typed anything (line 74), and a line erase via SHIFT-left-arrow, as in COMMAND mode (line 76). It responds quite nimbly (faster than you can type, if a speedup kit is operating) because valid characters are detected in line 73 and all other tests are bypassed.

The length of any typed input can be limited by assigning a value to ZZ before calling this routine. If you don't specify ZZ, it is automatically set to the limit that the keyboard buffer can accept by line 70. In case you set ZZ once but don't want to next time, ZZ is set to zero again, just before the return in line 77.

The secret of lower case is the use of POKE to put letters on the screen instead of PRINTing them. The subroutine at line 82 finds the current cursor location by reading the two addresses in the communications region that point to it. This location is assigned to variable ZM. Once determined by the GOSUB 82 in line 70, ZM is updated for each character entered. Each character

typed is POKEd to ZM in line 81 before the update.

To print lower case from a stored string, you need the subroutine at line 85. It also uses GOSUB 82 to find out where to start POKEing. It then dismembers ZZ$, to which any other string can be assigned, and lays it on the screen one character at a time, just like in the movies. Wouldn't a plain old PRINT statement lay an egg on television!

Now for the treat in Listing 3.

Program Listing 3 for RAM and ROM Monitor

```
60000 CLEAR 1000:DEFINT A,L,Z:CLS:PRINT
TAB(18)"MEMORY REGISTER LISTING":PRINT
60010 PRINT:F$="#####":B3$=CHR$(32)+CHR
$(93)+"---":GOSUB 60370
60020 PRINT"HIT SPACE BAR TO STOP LISTI
NG AND AGAIN TO CONTINUE":PRINT
60030 PRINT"WHEN THE SCREEN IS STOPPED.
...."
60040 PRINTTAB(5)"<S> CALLS FOR A DIFFE
RENT SCROLL SPEED"
60050 PRINTTAB(5)"<A> CALLS FOR A DIFFE
RENT STARTING ADDRESS"
60060 PRINTTAB(5)"<B> CALLS FOR BOTH OF
 THE ABOVE"
60070 PRINTTAB(5)"<E> EXITS AND REPORTS
 NUMBER OF ADDRESSES LISTED":PRINT
60080 AA=PEEK(16548)+256*PEEK(16549):ZZ
=PEEK(16633)+256*PEEK(16634)
60090 GOSUB 60310:PRINT:GOSUB 60340:CLS
60100 ' ---- TEST FOR PRINTABLE ASCII -
----
60110 IF PEEK(A)>32 IF PEEK(A)<127 PRIN
T A;B3$;USINGF$;PEEK(A);:PRINT B3$;CHR$
(32);CHR$(PEEK(A)):GOTO 60190
60115 IF A<AA-1 THEN 60180 ELSE IF A>ZZ
-1 THEN 60180
60120 ' ---- TEST FOR RESERVED WORD TOK
EN -----
60130 IFPEEK(A)>127 AND PEEK(A)<251 PRI
NTA;B3$;USINGF$;PEEK(A);:PRINT B3$;CHR$
(32);RW$(PEEK(A)-128):GOTO 60190
60140 ' --- TEST FOR STATEMENT END ---
60150 IF PEEK(A)=0 THEN T=PEEK(A+1)+256
*PEEK(A+2):IF T>AA AND T<ZZ THEN PRINT
A;B3$;:PRINTUSINGF$;PEEK(A);:PRINTB3$;"
-----STATEMENT END":A=A+1:PRINT A;B3$;:
PRINTUSINGF$;PEEK(A);:PRINTB3$;"-----NE
XT STATEMENT STARTS":GOTO60170
60160 GOTO 60180
60170 A=A+1:PRINT A;B3$;:PRINTUSINGF$;P
EEK(A);:PRINT B3$;"-----AT ADDRESS"T:A=
A+1:T=PEEK(A)+256*PEEK(A+1):PRINT A;B3$
;:PRINTUSINGF$;PEEK(A);:PRINT B3$;"----
-STATEMENT":A=A+1:PRINT A;B3$;:PRINTUSI
NGF$;PEEK(A);:PRINT B3$;"-----NUMBER"T:
GOTO 60190
60180 PRINTA;B3$;USINGF$;PEEK(A)
60190 A=A+1:N=N+1:FOR T=1 TO S:NEXT
60200 H$=INKEY$:IF H$="" THEN 60110
60210 H$=INKEY$:IF H$="" THEN 60210
60220 IF H$="S" GOSUB 60340
60230 IF H$="B" GOTO 60290
60240 IF H$="A" GOSUB 60310
60250 IF H$="E" THEN 60360
60260 GOTO 60110
60270 PRINT"END OF 16K MEMORY"
60280 PRINT"1ISTED";N;"MEMORY REGISTERS
":END
60290 GOSUB 60310:GOSUB 60340:GOTO 6011
0
60310 INPUT"START AT WHAT ADDRESS NUMBE
R";A
60320 IF A>32767 THEN A=A-65536
60330 RETURN
60340 INPUT"SPECIFY SCROLLING SPEED IN
LINES PER SECOND";L
60350 S=340/L:RETURN
60360 PRINT"END AS REQUESTED - ":GOTO 6
0280
60370 DIM RW$(122):B=0
60380 READ B$:IF B$<>"END" THEN 60380
60390 READ BB$:IF BB$<>"FOR" THEN 60380
60400 RW$(0)=B$:RW$(1)=BB$
```


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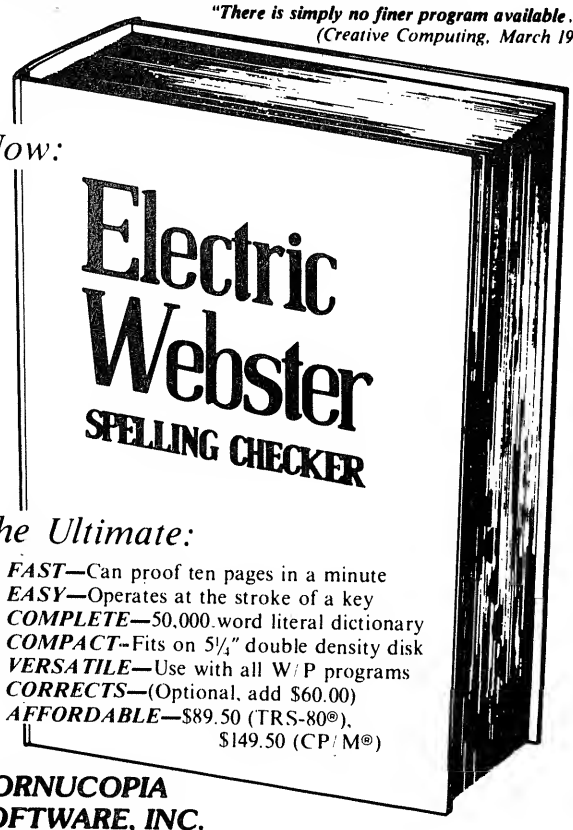

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```
60410 FOR J=2 TO 122:READ RW$(J):NEXT:R
ETURN
60420 DATA END,FOR,RESET,SET,CLS,CMD,RA
NDOM,NEXT,DATA,INPUT,DIM
60425 '----
60430 DATA READ,LET,GOTO,RUN,IF,RESTORE
,GOSUB,RETURN,REM,STOP
60435 '----
60440 DATA ELSE,TRON,TROFF,DEFSTR,DEFIN
T,DEFSNG,DEFDBL,LINE
60445 '----
60450 DATA EDIT,ERROR,RESUME,OUT,ON,OPE
N,FIELD,GET,PUT,CLOSE
60455 '----
60460 DATA LOAD,MERGE,NAME,KILL,LSET,RS
ET,SAVE,SYSTEM,LPRINT
60465 '----
60470 DATA DEF,POKE,PRINT,CONT,LIST,LLI
ST,DELETE,AUTO,CLEAR
60475 '----
60480 DATA CLOAD,CSAVE,NEW,"TAB(",TO,FN
,USING,VARPTR,USR
60485 '----
60490 DATA ERL,ERR,STRING$,INSTR,POINT,
TIME$,MEM,INKEY$,THEN
60495 '----
60500 DATA NOT,STEP,"+","-","*","/","["
,AND,OR,">","=","<"
60505 '----
60510 DATA SGN,INT,ABS,FRE,INP,POS,SQR,
RND,LOG,EXP,COS,SIN,TAN
60515 '----
60520 DATA ATN,PEEK,CVI,CVS,CVD,EOF,LOC
,LOF,MKI$,MRS$,MKD$
60525 '----
60530 DATA CINT,CSNG,CDBL,FIX,LEN,STR$,
VAL,ASC,CHR$,LEFT$
60540 DATA RIGHT$,MID$," "
```

If you type it correctly, you will have a monitor to examine RAM and ROM. It displays each decimal address and the byte it contains. If this byte has an ASCII equivalent which is printable (won't wreck the display), it is shown. If the byte is a token for a BASIC reserved word, that is shown. Any zero, with which Level II ends a numbered statement, is identified. Statement numbers are deciphered from the LSB/MSB notation used to store them.

The RAM location of the next oncoming statement which prefaces each statement number is likewise uncoded and displayed. Outside the RAM area containing a BASIC program, you get only the byte and its ASCII interpretation. Starting address and speed of listing are selectable and changeable whenever you have halted scrolling by touching any key.

This monitor can be used to look at itself, but it is most interesting and helpful when it is appended to another program. To do this, you need no special utility. If you are dismayed by some of the involved instructions for appending which have appeared, read on.

With the program that you wish to append already loaded, CLEAR the screen and perform these steps in command mode: (Results of step 1 are used in step 5, so please don't clear the screen again.)

(1) Type: PRINT PEEK(16548), PEEK(16549) and ENTER (two numbers are returned)

(2) Type: PRINT PEEK(16633, PEEK(16634) and ENTER (two numbers are returned)

(3) Type: POKE 16548,xxx:POKE 16549,yyy and ENTER. In the above, xxx is two less than the first number returned in step 2 unless this gives a negative number . . . if so, see fix below, and yyy is the second number from step 2.

(4) Load the appended program.

(5) Type: POKE 16548,aaa:POKE 16549,bbb and ENTER. In the above, aaa is the first number from step 1, which is still visible on the screen; and bbb is, of course, the second number from step 1. Now you're done!

If you're a bad luck type and the one chance in one hundred and twenty-eight came up that you got a negative number in step 3, just go back into your program and write a dummy line anywhere you can, such as:

```
17 'HAH
```

Now you're off the hook. Your LSB won't be negative any more.

String packing, anyone? Find a string in your appended program or, after you've saved this monitor, feel free to mess it up. Try the string right there in line 60000. RUN the monitor and see exactly where the letters in quotes fall. Copy down the exact addresses. Now break and do POKE xxxx,143s using these addresses. Be sure you don't POKE anywhere else, or your computer will die of fright — instantly. RUN the program and voila, mon ami! You have zee bar of white where was zee title! Look at line 60000 while you're at it and you'll see the traditional garbage of a packed string. Ah oui, monsieur, zee numbairs are tokens!

Seriously, you can see now that this monitor is not just a toy or an educational device. It has a workaday use. Set up dummy strings of the length you will need, using numbers:

```
A$="1234567890123"
```

Find their locations with the monitor and pack them to your heart's content.

Color Computer Conversions for Listing 1

```
'TO USE THIS PROGRAM (LISTING 1) ON THE
CC CHANGE THESE LINES TO:
10 CLS:A=1
60 PRINT@31,CHR$(N(X)):RETURN
70 PRINT@490,"TO PROCEED HIT ANY KEY"
90 CLS:INPUT"HOW MANY ITERATIONS";N
120 PRINT@234,"A="A;" B="B;" C="C
150 PRINT@234,CHR$(218)
160 PRINT@239,"DONE" ■
```

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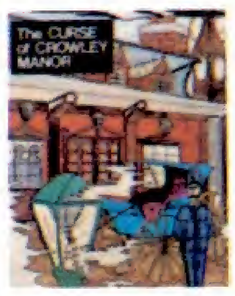

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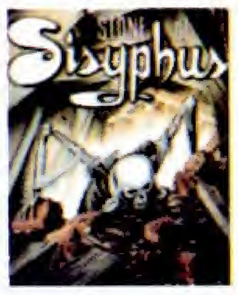

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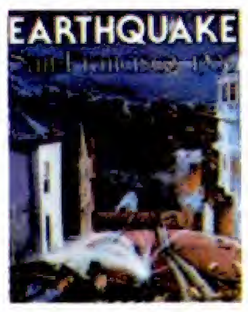

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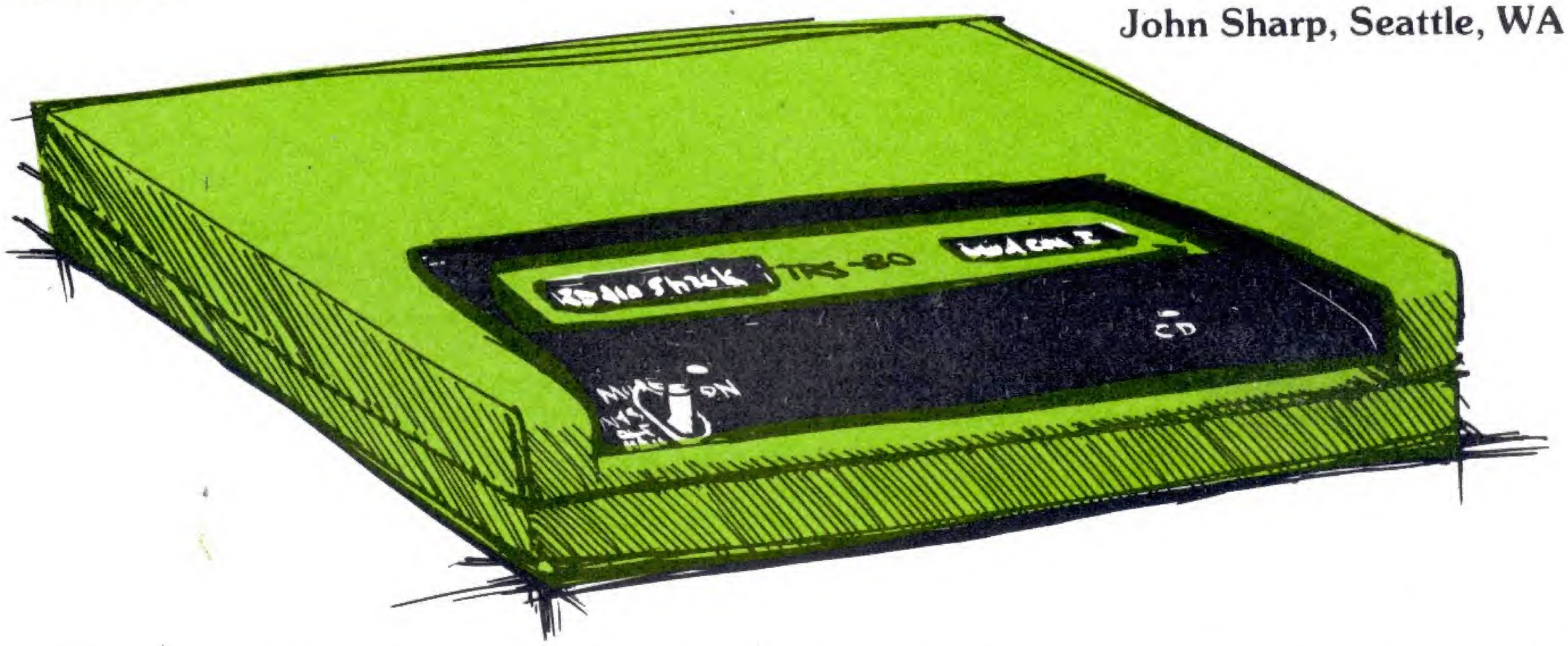

Although marketed as an accessory for the TRS-80 line, the Modem I should be compatible with most personal computers. If you'd like to access the computer bulletin boards and information services, but don't know what to put between the keyboard and the telephone, please read on.

Description

A modem converts data output from your computer to signals that will travel over ordinary telephone lines, and does the reverse for incoming information. The computer, of course, eventually breaks everything down to binary notation. It represents the binary digits one and zero as two distinct and unchanging levels; typical values for communications using the RS232 standard would be +12 volts for a zero, and -12 volts for a one. The phone, on the other hand, has to deal with the human voice, which varies continuously in level and frequency; it can't cope with the computer's electrically simple output. A modem converts each of the two binary signal levels into its own discrete audio frequency. Ma Bell will send a stream of these tones for you to somebody else's modem, which transforms the two audio tones back into their respective voltage levels. It sounds like a roundabout way to do things, and it is. It's done because the telephone network is already there, and it works.

This brings us to one of the strong features of the Modem I. Once you've converted your data to audio frequency signals, how do you get them onto the phone lines? The traditional way, for less expensive modems, has been to turn these signals into sound with a small speaker and feed the noise to the telephone handset. Follow the chain of events now: from binary voltages, to audio frequency electrical signals, to sound, back to electrical signals, then over the phone system to a receiver where the same process is repeated in reverse.

Every one of these transitions is an opportunity for trouble, but the sound-to-electricity step (called acoustic coupling) is a special sore point. Excessive room noise or movement of the modem/handset combination can cause transmission to be garbled. Worse, though, the carbon microphone in the telephone was never intended for really accurate response, and can itself cause enough distortion to ruin your signal.

The Modem I is a direct connect modem. It plugs right into your phone jack, and bypasses the telephone entirely for data exchange (you still use it to dial, though). This isn't exactly a new idea, but until recently, direct connect hookups were costly, and often involved renting a device from Bell. There are now several reasonably priced direct-connect modems available. Radio Shack's is one of the least expensive, and it has unique interfacing options that make it a good choice for some TRS-80 models.

I mentioned the RS232 standard. This is the most commonly accepted set of rules for pushing data around with small computers, and the main one followed by the Modem I. If you have a micro with a serial interface and some type of communication or terminal emulator software, chances are you can plug the Modem I in and go. There's a DB25 connector on the back which mates with standard cables used for RS232

equipment. If you have a TRS-80 Model I, II or III with a Radio Shack (or similar) serial card, this is the hookup you'll use. If, though, you have a TRS-80 Color Computer or an unexpanded Model I, there is another interface available.

A four-pin DIN type connector on the modem matches the cassette port on the Model I, and the serial port on the Color Computer, allowing you to connect either with an inexpensive audio type cable. Model I owners come out way ahead with this, since they can now use a modem without buying an expansion interface or communications card. A supporting software package (Cassette-Comm) is available from Radio Shack for less than ten dollars. This feature makes the Modem I and a Color or Model I TRS-80 about the cheapest computer-modem combinations on the market.

Of course, there is a catch. Data communications can be classified as half duplex or full duplex. In brief, full duplex allows simultaneous two-way transmission, while half duplex forces you to take turns. In practice, the biggest advantage of full duplex is that it supports character "echo." Under this scheme, your computer doesn't display the letters you send. The receiving computer sends back a copy that your computer displays as you type. So if you see your own input appearing correctly on your screen, you know for sure that the other machine got it straight. Since data can be sent in both directions simultaneously, the "echo" is given immediately, and the delay between keystroke and display is almost unnoticeable. In half duplex operation, characters are displayed as they are sent, and you have no way of knowing whether they were received verbatim.

The Modem I supports full duplex operation. The catch applies to those using the TRS-80 Model I cassette port option. There's no reason to expect a cassette interface to read and write at the same time, so the port circuitry wasn't designed for simultaneous bidirectional operation. The Model I will not provide true full duplex communications when using the Cassette-Comm option. Characters transmitted from your computer are given precedence over received ones. If you type on the keyboard while characters are appearing on the screen, your typed data will be sent but the incoming information will be garbled. This goes for the echo of the character you just typed, too. This isn't a crippling problem, and, for most people, not worth buying a lot of expansion hardware just to avoid.

Another limitation of the Cassette-Comm software is that it operates only at 300 baud. Again, for most people this is not a problem, since virtually all of the popular networks use this speed. If, however, you need to communicate with someone using a slower device (like a teletype terminal), you will have to go the RS232 route.

Operation

The first step is to make the connections to the modem. The link to your computer will depend on your machine, as described above. Power is supplied from a plug-in transformer similar to a calculator charger. The last connections go to the phone system. The modem's link to the outside world is a two-meter cord coming from the rear of its case and terminated in a standard modular phone plug. If your phone's wall connection is already modular, the modem's cord will go into the wall jack in place of the phone cord, and the phone plugs into an extra jack in the modem. If you don't have a modular jack, you'll either need to have one installed or use a splitter that connects both the phone and the modem to the wall jack at once. The assorted hookups to the phone and the computer are well illustrated in the manual. Regardless of how you connect, the modem remains attached to the phone lines at all times. Unless you use your RS232 line for other accessories, there's no need to plug or unplug anything. The telephone does not have to be near the modem, but can be as far away as the cord will reach.

Actual operation is very simple. Load your communications software and have it running, lift the receiver and dial your number. When you're sure you have the right party and they're ready to go, flip the mode switch from OFF to ANS (answer) or ORIG (originate) and hang up. Remember, your phone and the modem are basically sharing the connection, and if you leave the handset off the hook, the phone will still be "on line," mixing room noise with your data. When you're finished communicating, flip the mode switch back to OFF to put your telephone back in normal operation.

How do you decide whether to use ANS or ORIG? Getting back to the audio signals, remember that we used one tone to represent a zero, and another to represent a one. In order to provide simultaneous two-way communications on the same line, we use this pair of tones to send data in one direction, and pick another pair with very different frequencies from the first to carry data the other direction. Your computer will send on one of these "channels," and receive on the second. The other modem will receive on the first, and send on the second channel.

Naturally, both modems must agree closely on what frequency each of the tones will be. This is what the Bell 103 standard is about. A device built to this standard, like the Modem I, can communicate with any other conforming device. Both users, though, must agree on two more things. The first is speed, or baud rate. The next is who uses what channel in which direction. By convention, the modem where the call is originating has been assigned one channel to transmit and the other to receive. The modem on the answering end is expected to do the exact opposite. A modem with answer/originate capability does not (necessarily) automatically answer the phone or dial a call. It simply is able to talk and listen on each channel. In practice, if you initiate a call to someone who adheres to this convention, switch your modem to originate; switch it to answer if you're receiving the call. If you call someone with an originate-only modem, or take a call from someone with an answer-only device, you can reverse the usual switch position, and neither computer will ever know the difference.

Once you've made your decision and flipped the switch, both indicators on the front of the modem should light. The left one, marked

ON, simply shows that the unit is powered up and on line. If the mode switch is accidentally moved from the off position when you're not using the modem, this light tells you that any incoming calls are getting a busy signal. The other indicator is marked CD for "carrier detect." It lights whenever there is someone or something on the other end of the line. It does not tell you if incoming data is good or bad, or even if there's no data at all, but someone talking. It only shows, when lit, that the other party has not hung up.

Performance

A look inside the case reveals good layout, workmanship, and component quality. Also, we find that the modem has been designed around the Motorola MC14412 integrated circuit. This chip provides most of the "nuts and bolts" for digital tone generation and discrimination. This means that the modem's "tuning" is locked to a crystal oscillator, rather than depending on passive component values. Some modems set frequencies with resistors and capacitors, which can shift substantially in value with age and temperature. The result should be freedom from periodic adjustments. In addition, since the total parts count is fairly low, there will probably be fewer outright component failures than in more complex designs. In the six months I've been using the Modem I, my only problems have been operator error at the keyboard. It's been consistently reliable and easy to use. As far as I can tell, there has been no effect on normal phone service. The Modem I appears to be a carefully designed, well-built product. It offers the operational advantages of a direct-connect modem at a very reasonable price. These features, combined with Radio Shack's large retail and service organization, make it a good buy for anyone needing a reliable, basic modem. In addition, built-in interfacing options make it especially attractive to owners of TRS-80 Model I or or the Color Computer. ■

Modem I (#26-1172) is available from Radio Shack stores and dealers for $149.00.

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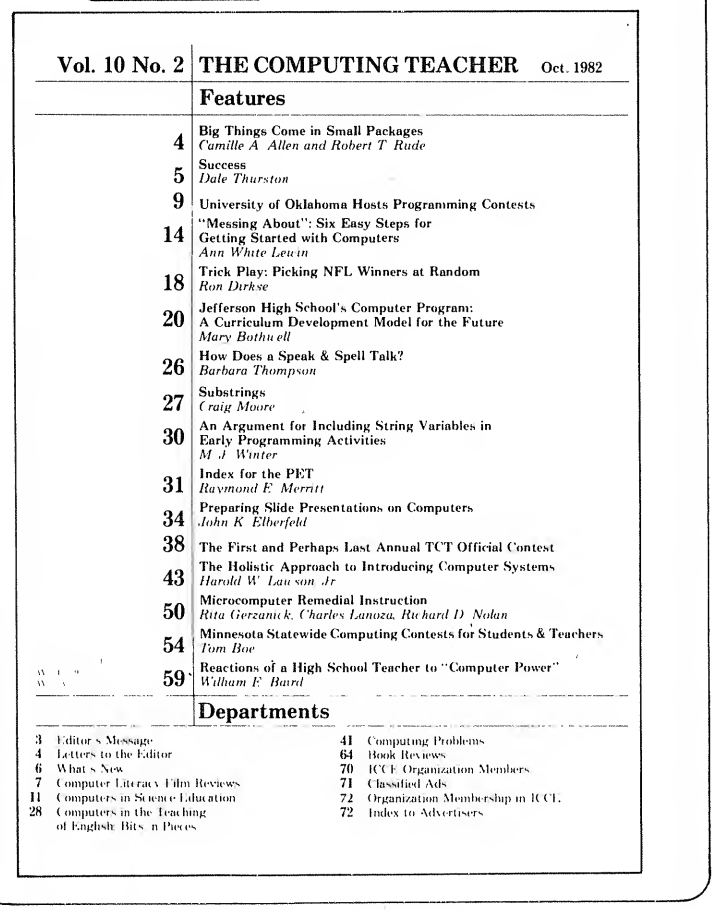

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The INKEY$ bug

How to squash it

Models I/III, PMC-80, LNW80

Ralph Vickers, Portland, OR

INKEY$ is one of the most useful and powerful functions available to Level II BASIC programmers. One of the most common uses of INKEY$ is as a sophisticated INPUT statement. When you use the INPUT function, you must key twice — first the letter or number instruction, then the ENTER key. INKEY$ reacts instantly to your instruction.

I had been using INKEY$ routinely for about three years on my Model I TRS-80 when I noticed that the function seemed to be developing a glitch.

You know that sinking feeling — at first I couldn't believe it. I carefully tested it. It was true. Program execution was plunging straight through the INKEY$ routine, not waiting for an instruction.

"Oh, no!" I screamed, tearing out my hair. There could be only one explanation — my battered old Model I was finally developing symptoms of senility. I could see myself, with the ailing keyboard cradled in my arms, woefully trudging to the nearest Radio Shack Store, into the lair of the leering repair technician.

After a sleepless night, I tested the function one last time in the cold light of day and discovered (glory! glory!) that it wasn't a glitch after all! It was a peculiarity of the function that I had never noticed — a peculiarity that can be a boon and a peril to unsuspecting programmers.

Some day, you may stumble into the same horrifying discovery the way I did. I want to tell you about it to spare you the mental anguish I went through. Then we'll see how to harness it to add a real touch of sophistication to your programs.

First, I guess I should explain how it all happened. I had written an adventure program and played it until I was utterly confident that every bug had been cornered and stamped out. Then I asked a friend of mine, Jack, to try it.

There is a recurrent sequence of swords and fantasy in this adventure where the hero is traveling along a rocky mountain trail. Suddenly, his keen senses warn him of danger . . .

Those dots after "danger" appear on the screen one after the other — a suspenseful pause in the tense drama. As soon as the dots finish appearing, the screen automatically clears and one of several messages appear that heighten the tension even more. The climax, whatever it is to be, comes on the next frame. To get there, the player must press the space bar.

When Jack started to play the game, practically every time he arrived at this sequence, the message would just flash on the screen for a moment and the program would roll right on to the climax. Program execution wouldn't wait for an instruction to proceed.

Naturally, I accused Jack of "riding" the space bar with his finger in the excitement. Jack, of course, denied it, but he became half convinced that I was right when he kept his hands well away from the keyboard and execution stopped at the message. Soon after, Jack would start playing in earnest again, the glitch would sporadically reappear.

I finally found out what was happening. To understand the explanation, you should write the following program into your computer:

```
10 CLS

200 PRINT @ 128, "PRESS (SPACE BAR) BEFORE 100";

250 FOR X = 1 TO 100

260 PRINT @ 160, X;

270 NEXT
```

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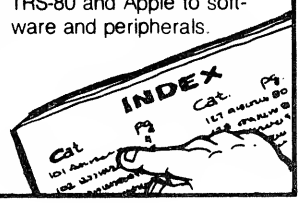

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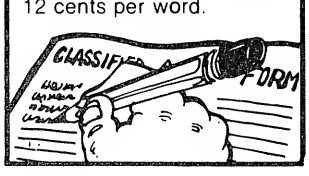

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INKEY$ bug

```
450 GOSUB 500

460 PRINT "INKEY$"

470 END

500 A$ = INKEY$

510 IF A$ = "" THEN 500 ELSE
RETURN
```

The first time you RUN this program, don't touch the space bar until after the count reaches 100. You'll find INKEY$ works as you'd expect it to. It waits for you to hit the space bar before proceeding to the program line that prints INKEY$ on the screen.

INKEY$ is a function that "strobes" the entire keyboard every fraction of a second. Until a key is pressed, INKEY$ has a null value. When you touch a key, INKEY$ takes on the value of the pressed key for one strobe. On the next strobe, a millisecond later, the value of INKEY$ is back to null. The program statement on line 500 conserves the fleeting INKEY$ value in A$.

Until a key is pressed, the value of A$ is also null. Null is expressed in BASIC as "". There must be no space between the quotation marks. Thus, when the program execution arrives at line 510, if A$ = null, program execution is directed back to line 500 to check if INKEY$ has now taken on a value.

When A$ finally obtains a value other than null (this routine will work if you press any key), program execution is directed by line 510 to RETURN to line 460.

Okay, RUN the program again. This time, however, hit the space bar before the count reaches 100. Just hit it once.

See what I mean? Program execution crashed through the INKEY$ function. It didn't wait for an instruction.

Somewhere in the computer's gizzards, a value was stored when you hit the space bar other than in INKEY$ itself. Then when program execution arrived at the INKEY$ routine on lines 500-510, that stored value enabled program execution to steam right through without waiting for a key to be pressed.

At first, when I realized what was happening, I assumed that the value was being stored in INKEY$ itself. After a lot of POKEing and PEEKing, I was satisfied INKEY$ was clean.

Now we get to a weird part. While pressing any key will make this "glitch" appear, I concentrated on the space bar, which was the key I was interested in. Therefore, I did most of my POKEing and PEEKing around two sections of memory. One controls keyboard operations and the other was the keyboard buffer.

In this discussion, we'll avoid sinking up to our hips in machine code alphabet soup. Suffice it to say that the two memory pidgeon holes under discussion are numbered 14400 and 16444.

By now, I could understand what Jack had been doing to "glitch" the adventure message. In his excitement, while the suspenseful dots were appearing on the screen, his eager fingers would occasionally press the space bar. Some sort of "trigger value" would be stored, lurking until the first opportunity to raise Cain in my adventure.

After much blood, sweat and tears, I found a remedy — or so I thought. The remedy, for a few heady moments, seemed even better than the INKEY$ routine I was using, because it restricted permissible responses to just the ENTER key and the space bar. (I could have tailored my INKEY$ function to be restrictive, too, but at this point I was grateful for anything.)

Add these lines to your program:

```
300 GOSUB 600

310 PRINT "PEEK";

320 END

600 SB = PEEK(16444)

610 IF SB<> 128 THEN 600 ELSE
RETURN
```

You can see a lot of similarity between the PEEK and INKEY$ routines. The main difference is that when you press the space bar, you generate a value equal to 128, and only that specific value will allow program execution to pass through.

Run the program as you did before. You will find that even if you hit the space bar before the count reaches 100, execution will remain at lines 600-610 until the space bar is pressed again.

This routine works just the same if you PEEK 14400.

No more glitches, I thought proudly. Problem solved, you clever devil.

Hah! After I had worked all of this out in a small test program, I reverently inserted my shiny new PEEK routine into my adventure program.

This adventure program is loaded with other INKEY$ routines that had never given me any trouble. These include calls for (Y)es or (N)o instructions, (T)hrusts, (P)arries and (S)lashes in swordplay.

To see what happened when I fired up the now fail-safe adventure program for a routine test run, simply DELETE line 320 of your program and run it again. See what I mean?

Apparently when the PEEK routine is activated, program execution automatically zooms through the next INKEY$ routine encountered. POKE and PEEK all you like, but I'm betting you can't disable this peculiarity by non-occult procedures. Anyway, I couldn't stop it.

I finally did find an answer. Now all of my INKEY$ routines look like this:

```
500 A$ = INKEY$

510 A$ = INKEY$

520 IF A$ = "" THEN 510 ELSE RETURN
```

Running program execution through two A$=INKEY$ statements nulls the mysterious stored value, wherever it is. I highly recommend this solution to fail-safe your INKEY$ routines. However, be sure that line 520 loops back to line 510, not to 500. If the loop goes back to line 500, the INKEY$ function won't react instantaneously to a single keystroke.

As I mentioned earlier, I did reap some spinoff advantage from all of this travail. I even wonder if INKEY$ was deliberately designed with its hidden stored value to allow the sort of neat input routine I have added to my repertoire, with its flashing, eye-catching symbols. I've seen "flashing cursor" routines before, but they are often slow. This one isn't. Add these lines to your program:

```
20 B$ = "*****"

210 GOTO 1000

1000 PRINT @ 158, B$;

1010 Y = Y + 1

1020 FOR X = 1 TO 10

1030 GOSUB 2000

1040 NEXT

1050 PRINT @ 158, "     ";

1050 ON Y GOTO 1010, 1070

1070 Y = 0

1080 GOTO 1000

2000 C$ = INKEY$

2010 IF C$ = "" THEN RETURN ELSE 460
```

This routine relies on the hidden value being stored somewhere other than in INKEY$, because the chance of program execution arriving at line 2000 during the millisecond that INKEY$ has a value other than null is pretty slim. The frequency of the flashing asterisks can be tuned to taste by increasing or decreasing the 10 in line 1020. You can also use graphics characters. For example, change line 20 to:

```
20 B$ = CHR$(143)
```

The moral of this story is that when you are programming, benefits may sometimes be gained, even when everything else seems to be going wrong. ■

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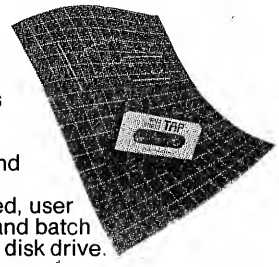

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Captain 80

The adventures of a software secret agent

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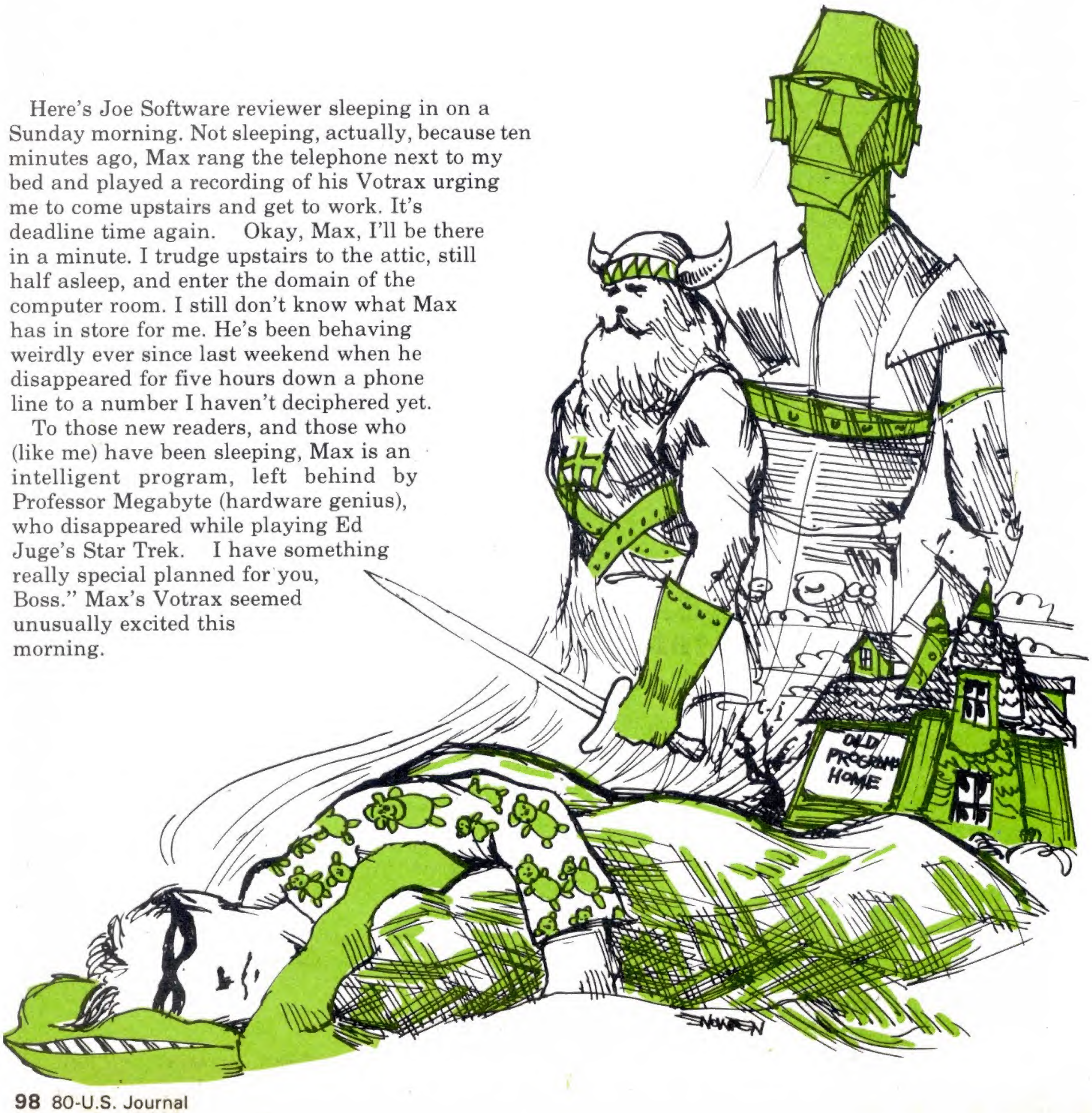
Here's Joe Software reviewer sleeping in on a Sunday morning. Not sleeping, actually, because ten minutes ago, Max rang the telephone next to my bed and played a recording of his Votrax urging me to come upstairs and get to work. It's deadline time again. Okay, Max, I'll be there in a minute. I trudge upstairs to the attic, still half asleep, and enter the domain of the computer room. I still don't know what Max has in store for me. He's been behaving weirdly ever since last weekend when he disappeared for five hours down a phone line to a number I haven't deciphered yet.

To those new readers, and those who (like me) have been sleeping, Max is an intelligent program, left behind by Professor Megabyte (hardware genius), who disappeared while playing Ed Juge's Star Trek. I have something really special planned for you, Boss." Max's Votrax seemed unusually excited this morning.



I sat down at the keyboard ready to look at the first selection.

"By the way," I said casually, "where were you last Saturday?"

"There's a theatre in Boston that has computerized projector switching," Max replied. "Their business computer and I are old friends. He arranged for me to see the movie TRON."

Oh no!

I knew what was coming before the digitizer kicked on. I'd seen TRON also, and had *no* desire to be loaded onto the game grid or any other grid.

"Max, don't *DO IT!!*" I shouted . . . too late.

"Relax," the Votrax echoed in my ear as I floated through the ionosphere of the TRS-80. "I think I have the whole thing under control now."

I wonder what the penalty is for assault with intent to commit cybercide.

Usually when Max downloads me somewhere I end up in the world of the program. And I hit with a bone-jarring thud that rattles my teeth. But this time I redigitized in a room filled with strange people I'd never seen before. This was weird. Then I remembered TRON.

"Sit down, user," said a tall youngster sitting at the head of a huge oblong table. That was when I noticed that everyone I was with was not human.

"For your convenience," the youth continued, as I took a seat, "we shall introduce ourselves by the names most familiar to you, that is, the commercial names our programmers gave us."

He paused.

"I am E.P. You'd know me better as Electric Pencil. My rival," he gestured toward a well-dressed older man, "is Scripsit."

"R.A.'s the name, Robot Attack to you," said a pastey metallic-looking kid, not even out of his teens.

"And I'm Zork." This from a muscled barbarian at the far right of the table.

"We're here today to tell you how life really is here in the world of microcomputing. Come with us."

They lead me out of the room and down a hallway to a small observation room. Beyond the one-way glass could be seen a variety of electrical instrumentation. Strapped to a vertical table was a vigorous-looking barbarian warrior not unlike Zork, except much smaller.

Zork spoke.

"This is the review grid," he said with a shudder, "we all have to face it at one time or another."

"I still remember *my* first encounter," remembered Robot Attack."

"Who's the program?" I asked.

"Tower of Orlandor," replied E.P. "He has had a tough time of it from birth. His programmer didn't debug him thoroughly and he was very sickly as an infant. Wait, here comes the first review."

Then the group let out a collective gasp.

"Oh, no, it's 80-Micro!" I heard someone say.

Silently, I watched the words roll out over the monitor at the top of the room.

Aaron Silverstein was the author of the review. I know him. He's eleven years old, and pitcher for my little league baseball Pirates.

"Much is left to the imagination . . ." came the words across the screen. The program that was strapped to the table winced in pain.

"Missing is the verbal interaction of the traditional adventure . . ." Meteors were dancing and little bolts of electricity were flying all over the room.

"For the sophisticated player, this program will fall short of his expectations . . ." The room came alive with lightning. Every needle on every meter pegged. The program on the table, terror on his face, yelped and strained against the straps, then lapsed into unconciousness.

Two program apprentices in white coats came into the room and loaded him onto a gurney.

"Those guys are Med-systems Medics," explained Robot Attack. "The Med Systems Group is very

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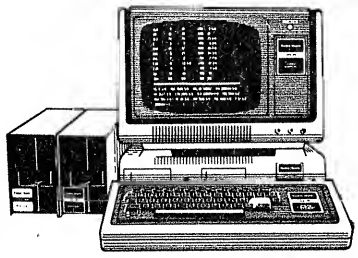

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strong right now, and the reviewer had given them an honorable mention in the review. So Tower is being taken to a transfusion room to be injected with surplus kind remarks until the results of the review came back."

I was visibly shaken as they led me from the observation chamber.

We boarded a transport beam and teleported to another part of the city. When we arrived I was very much taken aback by the contrast between the modern silicone-based city, and the run-down old replica of a Victorian house facing me now. But what rattled me most of all was the sign over the front door. It read "Old Programs' Home." And under that, in smaller letters, "Abandon Hope Ye Who Enter Here."

"You see that old lady over there?" E.P. whispered quietly.

I nodded.

"That's Interlude. She was once the most healthy, robust program in the world. Reviewers showered her with compliments, she was the toast of the town."

"And that old geezer over there ," Zork put in, "he's the oldest resident here. Original Adventure, they call him, though he prefers to be known as Microsoft Adventure these days." Then Zork added reverently, "He's my grandfather."

"And the guy over there," said Robot Attack, "with the antennae on his head, my grandfather, Android Nim."

And so they introduced me to the geriatric programs. Space Invaders, Greg Hassett Adventures, there were ten of them; Fasteroids, whose son works for Scott Adams; Doodles and Displays, Snake Eggs, Pirate's Cove, still spry, even though on social security; and . . . Oh NO! Not Taipan . . . not (choke) Taipan!

"It's ok, sonny," Taipan said in his slight Chinese accent, "I got a grandson working in Apple."

What a relief.

I said goodbye to the old folks as we departed. We took a transport beam uptown. I didn't know if I could take much more of this. The sign above the door of the sleek modern building said, simply, "Nursery."

We walked down the well-lighted corridors peering at row upon row of incredibly cute babies. Adventure International, Med Systems, Big Five, Soft Sector Marketing and Computer Shack all had incubators and cradles filled with squirming, lovable infants. Even Radio Shack had a full house.

But there was a room marked Mad Hatter Software and it was full of cobwebs and empty cradles. Likewise, so was the one marked Computer Light and Sound and the one marked Adventureworld. These were names I knew well, names of companies who publish no more.

I looked around for The Programmer's Guild. There were three babies for the Color Computer lying, smiling at me; Pac-Droids, Tower of Fear and Dragonquest, whose father was in the advertising building we'd passed on the beam over.

"These programs," said Zork, referring to the hundreds of babies around me, "are the hope of the future. Some will grow up to be mailing lists, some will be adventure games, though those are an endangered species, some will be arcade games. Many will have long life spans and some . . ." he hesitated for a moment, ". . . won't live at all."

We retired back to the conference room.

"I have so many questions . . ." I began. But as I spoke, a distant bell began ringing somewhere and the scene in front of me began to waver and de-rez.

"Remember us, user," called out Zork.

The ringing grew louder and louder as everything grew fuzzy and indistinct. I opened my eyes and found myself staring at a clattering telephone. Dazed, I picked it up only to hear Max's Votrax intoning, "You're *oversleeping!* Get with it."

Grudgingly, I crawled out of bed and trudged up the stairs to the attic.

"I have a nice surprise waiting for you this morning," said Max as I entered the room.

I stopped cold. There was new machinery in the attic. And Max was being awfully polite.

It's Sunday, the sun is shining. Nope, I'm not hanging around up here today, I'm going to work on a new program I've been thinking of . . . on the computer in the basement. ■

Basically BASIC

The IF...THEN...ELSE statements

All Models

James A. Conrad, Seattle, WA

One of the most powerful features of a computer is its ability to make decisions based on mathmatical logic. It tests the true/false condition of an expression and decides which of two logical branches to take. BASIC does this with conditional transfer statements.

Conditional transfer statements operate only if the condition expressed is true. The most frequently used form (and the only one early versions of BASIC had) is:

IF (expression) THEN (line number)

Let's start with it in a simple program:

```
10 INPUT "ENTER 'YES' OR 'NO' "; R$

20 IF R$="YES" THEN 100

30 IF R$="NO" THEN 200

40 PRINT "WRONG INPUT" : GOTO 10

100 REM control transferred here from line 20 if
R$="YES"

110 PRINT "ANSWER IS YES"

120 END

200 REM control transferred here from line 30 if
R$="NO"

210 PRINT "ANSWER IS NO"
```

What happens when we RUN the program?

Line 10 prints the prompt message ("ENTER 'YES' OR 'NO' ") and assigns the input to the variable R$.

Line 20 does two things: The IF portion tests the condition of the expression R$="YES." Then, if the condition is true — i.e., if the variable R$ contains the string "YES" — the program transfers control to line 100. "ANSWER IS YES" is printed and the program ends. If the condition is false — i.e., R$ isn't "YES" — the program defaults or falls-through to line 30.

Line 30 performs a similar operation, testing the expression R$="NO." If the test is true, program control transfers to line 200 and line 210 prints "ANSWER IS NO." If the test is false the program proceeds to line 40.

Line 40 is an input checking routine (see Basically BASIC, Oct. 82). If the input is neither "YES" nor "NO" program control returns to line 10.

Line 120, an END statement, is necessary to prevent the program from continuing to the next line, which is a separate routine (module).

A slightly expanded form of IF...THEN allows any statement to follow THEN:

IF (expression) THEN (statement)

```
10 INPUT "ENTER 'YES' OR 'NO' ; R$

20 IF R$="YES" THEN PRINT "ANSWER IS 'YES' "

30 IF R$= "NO" THEN PRINT "ANSWER IS 'NO' "
```

Multiple Statements

The IF...THEN statement can be further expanded to allow several statements, separated by colons, following

THEN. The form is:

IF (expression) THEN (statement) : (statement) : ... : (statement)

```
10 INPUT "ENTER '1' OR '2' " ; R

20 IF R=1 THEN PRINT "ANSWER IS 1" : LET R=0 :
GOTO 1000

30 IF R=2 THEN PRINT "ANSWER IS 2" : LET R=0 :
GOTO 2000

40 PRINT "WRONG INPUT" : GOTO 10

1000 REM control transferred here from line 20 if R=1

1010 ... program continues here ...

1190 END

2000 REM control transferred here from line 30 if R=2

2010 ... program continues here ...
```

In this example lines 20 and 30 use three statements to perform three separate tasks when the expression is true:

1. A PRINT statement shows the response.
2. An assignment statement (LET R=0) gives variable R a new value.
3. A transfer statement (GOTO ...) shifts program control to the stated line.

If the expression is false, program execution will fall-through to the next *numbered* line — none of the statements following THEN will be executed. This can be tricky for beginners who sometimes think that the colons act as line separators and expect the statements following colons to be executed as if they were on separate lines.

ELSE

ELSE is a default. The statement(s) following ELSE will be executed only if the expression is false. The form of the IF...THEN...ELSE statement is:

IF (expression) THEN (statement) ELSE (statement)

```
10 INPUT "ENTER A NUMBER" ; N

20 IF N=6 THEN PRINT "N IS 6" ELSE PRINT "N IS
NOT 6"
```

In line 20 if N (the number input) equals 6, the expression N=6 is true and the statement following THEN (PRINT "N IS 6") is executed. If the expression is false (N is not 6), control transfers to ELSE and the default statement following it (PRINT "N IS NOT 6") is executed.

Converting ELSE to Other Dialects

Some BASIC dialects (e.g., Apple, Atari) don't have the ELSE statement. If you're writing a program for them you will have to arrange the program flow so that the line following the IF...THEN statement is the default (the statement to be executed if the expression is false). For example:

```
200 IF X=7 THEN PRINT "YES" ELSE PRINT "NO" :
GOTO 500

210 ... program continues here if X=7 .....

500 ... program jumps here if X<>7
```

To convert this to a dialect that doesn't have ELSE:

```
200 IF X=7 THEN PRINT "YES" : GOTO 220

210 PRINT "NO" : GOTO 500

220 ... program continues here if X=7 .....

500 ... program jumps here if X<>7
```

Line 210 has been changed to a default statement so if the expression (X=7) is false the program will fall-through to it. The program then jumps to line 500 and continues.

If the expression is true, execution jumps over the default to line 220, where the program resumes.

Programming Tips

1. All statements following THEN or ELSE are

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conditional and execute only if the expression is true (THEN) or false (ELSE). Don't put a statement here unless you want it to be executed only on the condition of the expression.

2. Test all possible conditions for each IF, THEN and ELSE separately — using bad as well as good data. This is especially important if you don't expect much use from an ELSE statement. The BASIC interpreter won't catch an error in an ELSE statement until the ELSE statement is used. Many experienced programmers going too quickly have left errors in programs because of inadequate testing.

3. THEN is sometimes optional (check your Reference Manual to find when). However, omitting THEN is not a good idea, as many programmers discovered when they tried running programs on a Model II which were written for the Model I. Most BASIC dialects require THEN. If you get into the habit of omitting it you may have problems when you upgrade or write a program for another dialect. It's easier to avoid a bad habit than to break one.

4. When using IF...THEN, especially in a loop, it's a good idea to use the greater-than-or-equal-to relational operator (>=) instead of just an equal sign.

If the index variable in a loop is stepped (i.e., if it doesn't count every integer) it might skip past the test. For example, if your test is N=4 and the loop is FOR N=1 TO STEP 2, N would never equal 4. The proper code here is IF N>=4 THEN . . .

If the number for which you're testing is one that has been calculated, it might end up as a decimal slightly off what you expected it to be. You can combine these two ideas by using the test IF N>4.001 THEN ... If you're not used to doing this, stick in a REM statement so someone else reading your program (or you, reviewing it a year later) will know what you've done.

5. If stepping past a test number isn't a concern, here is a sophisticated solution to the problem of slight variations in calculated numbers. Use the form IF ABS(A - B) <.001 THEN .... The index variable is A and B represents the calculated number. Any acceptable tolerance may be substituted for the .001 in the example.

6. GOTO, when used as part of a multiple statement line, must be the last statement on the line. The line IF...THEN PRINT A : GOTO 200 : PRINT B ELSE PRINT C: GOTO 500 : PRINT D will never print B (if the expression is true) or D (if the expression is false).

7. The form IF...THEN (line number) must have an actual line number — not a variable. (Likewise, GOTO must always have a real line number to go to.)

Conclusion

IF...THEN...ELSE... statements have many more advanced uses than we've discussed here. A programmer can combine true/false tests in the expression by using AND, OR, NOT logical operators. The statements can even be nested — one inside the other. But this can be confusing and dangerous and it requires rigorous testing.

These statements are some of your most powerful programming tools. Study them. Experiment with them. You'll find your programming becoming more sophisticated and elegant. That's BASIC.

Table I
Definitions

STATEMENT:
An instruction to the computer. Contains (or is) a verb (e.g., PRINT, GOTO). Tells the computer to do something.

EXPRESSION:
Mathematical formula or equation.

OPERATORS:
Used to perform the operation(s) in an expression. There are three kinds of operators:

ARITHMETIC (+ - * / 1) perform arithmetic operations.

RELATIONAL (<>=<=>=<>) test if relationships are true or false.

LOGICAL (NOT, AND, OR) perform logical operations.

CONDITION:
True or false nature of an expression.

COLON:
Separates statements in multiple statement line.

FALLING-THROUGH:
Default in an IF...THEN statement without ELSE. Program execution "falls-through" to the next numbered line when the condition of the expression is false. ■

Tandy topics

Ed Juge, Director, Computer Merchandising
1500 One Tandy Center, Fort Worth, TX 76102

This time of year is another busy one for us. Each fall, Radio Shack holds meetings for each of our five regions, where we gather all of our company store managers for a two-day meeting. We introduce the new products to them for the coming catalog (1983, in this case), get feedback from them, answer their question and listen to their problems. In addition to the five regionals, there are also meetings for our dealers and international franchisees, and this year we held our first annual computer store meeting. So, there has been a lot of traveling, talking, and catching up on day-to-day work.

Last month, I introduced you to our new year's computer lineup. Have you gone in for your new computer catalog yet? Well, I'm going to tell you early-on about a couple of errors. If you can't relate some of this to your catalog, don't worry. We found some of them in early versions, and we will try to correct them in all but the first print-run.

On page 28, the Screen Cleaner kit (#26-1318) price is in error. It should have been $6.95, not $2.95. Then, on page 17, we listed "Programmer-80," a COBOL program generator for the Model II. When we started the catalog, it was looking great! We expected a really outstanding program. When we got our first look at the completed program, a couple of weeks ago, we all agreed that it just wasn't up to expectations, so we have killed the product altogether.

Sorry, but a little egg on our face is a lot better than a bad $750 investment on your part. Profile Plus does everything Programmer-80 was able to do, and in most cases, more. Is that enough, or shall I ask how many of you noticed the two-drive Model 16 pictured in the big 1983 Radio Shack catalog along with the story on the 1-drive unit? Well, in case you did, it was an error. We have not cut the price of Model 16!

Modem II Owners

I started to hook up a Modem II this week, and found the manual a bit less than helpful on programming it. When I tried to program the modem, I found the manual painfully lacking in information on how to accomplish this feat. In fact, I don't think you can program it from the manual!

While I was chewing on Roy, the Product Manager, about the quality of his manuals, he kept insisting that instructions with examples are included. He'd used them—even duplicated them for use in the newsletter. Well, we pulled a copy of the type which came back from our typesetter, and sure enough, there were several pages of instructions and examples. How they managed to get lost between that stage and the printed manual, nobody really knows. I've told Roy to have them reproduced, and we'll make them available to you in three ways. Take your choice: 1) Call Customer Service and they will mail you a copy. 2) We will reproduce them in the November *Microcomputer News*. 3) We will get one copy to each of our stores, where you can copy down what you need.

Questions?

We occasionally get questions on our upgrade policy for software. I'd like to take a minute to explain it. We break our replacement/exchange items into four general categories: Necessary error corrections, minor changes which aren't necessary for proper operation, enhancements to the program, and exchanges.

For necessary changes, we'll obviously give you a patch, if it's simple. We'll make available updated disks through your local store at no charge if you don't trust yourself making patches to an important program.

Cosmetic, or minor changes not affecting your use of the program, are available for order through your store at a minimal charge to cover the disk cost and handling... maybe $10, or so. Enhancements, like new tax tables for payroll, or programs with added features, carry a reasonable charge, based on the change involved (maybe $25 to $100).

If we offer an exchange (for example, Business Mailing List to those owners of our first Mailing List package), it is typically at the

difference in the original package selling prices, but it could be more. These enhancements also include any known patches to the program.

Now, a point of misunderstanding . . . there is not, nor will there ever be *always* an upgrade or exchange offered. For example, Super Scripsit is not offered to owners of Model III Scripsit, for an upgrade cost. It is not an improved version of Scripsit, but a new word processor, with an entirely new operating philosophy. None of the code is the same — it is a totally new design. We retained the name Scripsit because it has become generically associated with our word processing software. We do give you a way to transfer your existing Scripsit files if you buy Super Scripsit. The same is true of Model I/III Profile and Profile III Plus. They are totally different database management packages.

In general, but I don't promise always, we *will* have an upgrade patch on programs where the original is enhanced or modified, and we *won't* where the new package is a totally new offering of the same category of programs.

The Good News

Color Computer owners should look up our new Poltergeist game. It's patterned after the MGM Stephen Spielberg movie of the same name. If you liked the movie, you will have a ball trying to get Carole Ann out of the clutches of the poltergeist! It's available right now, and we're all very excited about working with MGM on this project.

Several other new Color Computer games are ready: Micro-Painter, a great "coloring book" program for the youngsters; Tennis; and Megabug, a really great "maze" game with a totally new twist and dynamite graphics.

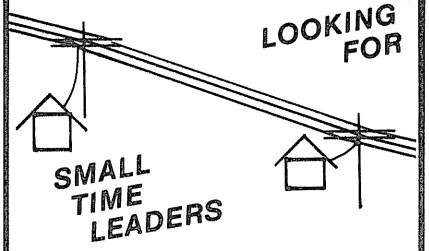
Don't have a Color Computer yet? Well, the biggest news of all is our fantastic $100-off sale on all models during November and December. There will never be a better time to buy.

Software Developers

We've been working on a new program for software developers who want to write software for our computers and sell it themselves. Now it's in operation, headed by a fellow you should get to know, Phil Kitchen. I'll not cover it all here. I will let Phil provide the details.

I will say that there are two things we're going to be doing. First, we're going to have a program to provide outside vendors, who sign up, with inside technical information, software and documentation guides, the ability to license TRSDOS for reproduction, and more.

Second, we're setting up a software review program, where we will review outside software, and send information to our Computer Centers on the best software we find in each category, along with where customers can order it. We recognize that many of you specialists are much better equipped to work with customers in specialized software areas than we are. So, we'll try to help you get in contact with potential customers and, of course, we hope it will help us sell our hardware. Interested? Write to Phil Kitchen at 1500 One Tandy Center, Fort Worth, TX 76102. ■



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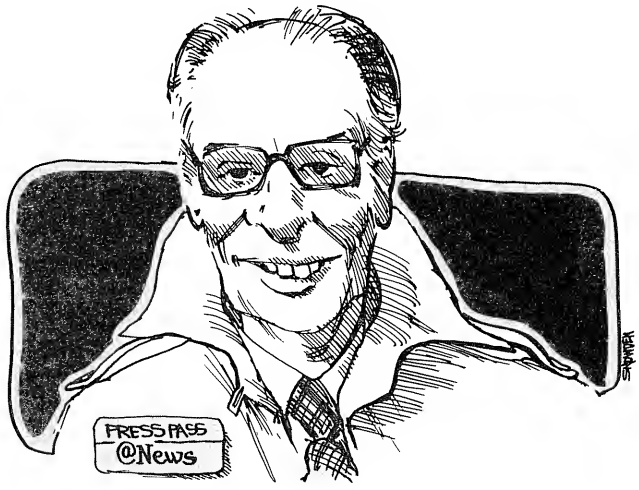

Good News from Sunnyvale

It's always a pleasure to be the bearer of good news. This month I have some good news for past, present and future users of the stringy floppy.

First of all, wafer design specifications have recently been revised, new quality control measures have been established and the manufacturing line has been completely retooled. Reliability is so much improved that the warranty has been liberalized. Certified wafers are guaranteed forever. Uncertified wafers are guaranteed for thirty days. The new higher quality wafers can usually, but not always, be identified by a frosted bar molded into the back shell. I have one box of new twenty footers. Based on this limited experience I doubt that Exatron is going to lose anything on the revised warranty.

The longest wafer now available is 50 feet. With the Model I clock, this is a capacity of 40960 bytes minimum. Actual capacity tends to run in the neighborhood of ten percent higher because wafers are always assembled with more than the nominal length of tape. I cannot urge users strongly enough to get the speed-up kit for $19.95 (plus $30 if Exatron installs it). With it you get a guaranteed fifty percent increase in wafer capacity. You may be able to switch to a 100 percent increase if your Model I will take it. Often it's a simple switch from the Z80 chip to the Z80A which makes this possible. When your wafer capacity doubles at no extra cost, when @LOAD and @SAVE take half the time and when your programs all execute twice as fast, it's heaven! You'll never want to trade "down" to a Model III computer with disk drives and a 2.3 megahertz clock.

Users of the stringy will marvel at what has happened to the classic Model I version. We've already mentioned the powerful, whisper-quiet direct drive motor and the beeper that sounds whenever the EOT/BOT sticker is read. Now grab your seats. Drive 0, the master, is priced at $99.50, down from $249.50. A starter kit of accessories and essential software raises this to $124.50. This kit, at $25, lacks two or three programs of being as complete as the old $50 kit. You can buy the missing programs when and if you want them for less than $25. Additional drives are also going for just $99.50.

That awful decision to charge $100 per hour of labor for service has been rescinded. Non-warranty service on Exatron manufactured gear is now a sane $35 per hour, plus parts, with an $18 minimum.

Crystal Ball

In the hectic world of microcomputer technology it's dangerous to make promises because all manufacturers are busy with so many new developments. Exatron seems to be no exception. However, by the time this appears in print, Exatron may have a free fix ready for owners of the new TRS-80 Model III ESF who are unhappy with how its operating system now patches into high memory. For prospective buyers this will be a huge incentive.

You may remember that in the August issue I showed my editorial independence by announcing a minus for the Model III version of ESF. You can't put a machine language program in protected high memory. Exatron is working on an operating system which will reside in low memory and simply move the start of BASIC (user RAM) up a couple of thousand bytes. You won't need 48K of memory, either. Also, a hardware fix may, I said *may*, incorporate a permanent real-time

clock which stays on at all times with battery backup in case of power failure. Exatron has several "irons in the fire" which I'm not free to divulge, hence the exact timetable for these developments is somewhat uncertain. All this simply adds up to improved prices and services to ESF users.

Apologies to Dr. J. C. (Jack Crenshaw)

In August this column quoted a sentence from Dr. Crenshaw's recent letter. He said some disparaging but justified things about the Model I Level II cassette system and the old-style keyboard. He was at that time attempting to patch a stringy floppy into his Model I Level I machine. My public response was to advise him against trying to hitch a race horse (ESF) to a donkey cart (Level I BASIC). Thank heaven I concealed his identity. Within days I had a three-page letter from the doctor which (1) humbled me, (2) fascinated me and (3) flattered me. That a man of Dr. Crenshaw's stature would take the time to respond to such an upstart as I!

Dr. C. turns out to be a long-time systems designer who has forgotten more about computers than I'll ever know. For him, Level I isn't so much a language in which to program as a utility to access the Z80 so that he can write, store and load machine language programs. Wish I had space to share the wealth of knowledge and insight which he packed into those three pages. I'll have to settle for a small sample of quotes:

". . . I got into this thing pretty early. I was one of the first owners of TRS-80, bought in early '77 . . . I also ordered Level II, the EI and disk drives as soon as they were announced . . . One day I realized I was computing more and enjoying it less . . . I sold my EI and drives and, when the opportunity came to trade back down to Level I, I took it."

"Was it a mistake? Perhaps. I must admit that when I see the ads for all that neat software available, my mouth sort of waters. Since I got the ESF, I've been especially conscious of the incompatibility . . . I'd love to just be able to load some of Exatron's software. I've been looking into a mod to let me run either BASIC, but I think the solution is to hold out for Exatron's 64K RAM so I can run whatever I like."

"I did disassemble Level I, and I liked what I saw. As you probably know, Level I BASIC is an extension of Li-Chen Wang's Palo Alto Tiny (BASIC). This interpreter . . . is a masterpiece of good structured design . . . I also disassembled Level II and I didn't like what I saw . . . Things like jumping into the middle of multi-byte instructions, using a byte as both data and code, or using self-modifying code are tricks that programmers just love, but they lead to nothing but trouble . . . bugs and maintenance problems. Bill Gates uses all of these in Level II."

". . . one of the tricks used in Level II is to lace all control flow in and out of the ROM thru jump vectors. This is a mixed blessing. It permits extensions to the language . . . it lets you patch the screw-ups, like keyboard debouncing . . . but it also means that everything you do depends on the current state (and therefore, the past history) of the system. All robustness obtained thru the use of ROM is lost."

"You say that Level II is incredibly powerful. I think you are making a common mistake that says that bigger is better. BASIC is a limited language at best, and adding PEEK and POKE doesn't necessarily make it more powerful. I've seen some (programs) . . . where assembly language code is loaded in DATA statements then executed by USRs. Does the ability to do this make Level II more powerful? I don't think so."

"I remember in my dirt-biking days seeing a lot of middle-aged executives in their second childhood. These guys . . . would invariably go into a cycle shop and buy the biggest, hairiest bike they had. Then they would take it up the mountains and charge around . . . until they either center-punched a tree or scared themselves badly . . . later the bike would be up for sale. My approach was to get a bike I could handle."

". . . too many people got persuaded by the Radio Shack salesman to go for Level II . . . as though it were somehow a disgrace to have Level I. Some of them learned how to use the more powerful system. Some didn't and may never use a computer again."

Dr. Crenshaw graciously accepts my pointed criticism of his position as a friendly one, which of course it was. He also says he is now using Workshop Chairman John Wickliffe's Level I operating system for the stringy, ". . . until I can develop my own ROM." (Humiliating, isn't it, fellow beginners?) He has also written his own Level I driver for the Epson MX-80. All in all, the opinions of such a qualified person must be carefully considered. I still find occasion to disagree (albeit more respectfully) with some of his conclusions.

Rather than sounding off again, I prefer to invite readers who may be interested to tell @NEWS how they feel about these matters. We just might have a first class brawl going. As the old circus workers used to yell, "Hey Rube!" ■

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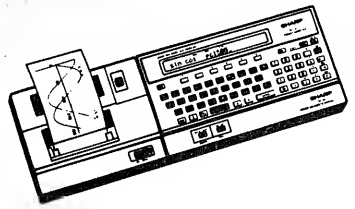

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Reviews

Modem 80
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Lansing, MI 48906
orders (800) 248-0284
office (517) 482-8270
$39.95

Yes Virginia, there is an intelligent terminal program, including disk I/O, for under $40! Modem 80 is a complete package consisting of seven different programs allowing the user to perform a variety of functions. If you use CompuServe, The Source, Micronet, Dow Jones, or any other service, an intelligent terminal package is a must and this product is one of the best values on the market.

I used Modem 80 to communicate with three different systems, in three different ways, and it functioned without error each time on my Model III and Radio Shack Modem I. I used the program to transfer BASIC programs to the local college's PDP11. Even though their computer costs $500,000 its BASIC is not nearly as advanced as a TRS-80's. Programs written on a TRS-80 will not RUN on most large computers, but in this case the programs transferred without error, which was the point of the test.

Secondly, I called a local bulletin board run by a computer store. No problems encountered here either. Lastly, I used Modem 80 to access CompuServe.

Using CompuServe was great with Modem 80. I put everything on disk and then edited what I wanted when I went off-line. Since I have to call long distance I made much better use of my on-time by not having to read as I went along.

Thirty-five pages of documentation are provided in a three-ring binder. The manual is both good and bad. It is not written for the first time user and this can present problems. A glossary is included, as well as an explanation of general data transfer and a list of Binary to Hex to ASCII to EBCDIC values. Also, a template is supplied to put near number keys that are used as control keys.

Default parameters may be changed to accommodate communication with any computer. Baud rate may vary from 110 to 9600, duplex may be full or half, word length five to eight bits, parity even, odd (or none), and stop bits one or two. Other specifications can be changed as well.

The CLEAR key acts as a control key for Modem 80 and is used with the top row of keys. Standard control characters are sent using the SHIFT & DOWNARROW & LETTER keys. Brackets can be generated by CLEAR & 8 or 9 keys and a backslash is CLEAR & 7 keys. The screen can be cleared locally with the CLEAR & * keys.

If you're on your local bulletin board and wish to transfer a program from their system to yours, use CLEAR & 3 to receive the file. After you're finished filling the RAM, you close the file with a CLEAR & 3. RAM is automatically saved to disk before you exit Modem 80 or, if the RAM becomes filled, a pause is issued to the host and the file is saved. A file can be manually written to disk anytime. Remember, all information can be stored; menus, newsletters, programs, anything coming through the modem.

Sending a file is just as easy. A CLEAR & 2 is used to send any file currently on disk. The file may be sent at one time or it may be sent one line at a time. An echo feature is also available to insure proper transmission. The printer is toggled on and off with CLEAR & 4; this also includes a 256-byte buffer in case your printer can't keep up with transmission. If you don't remember if the printer is on or off, or receive is open or closed, etc., a CLEAR & 5 indicates status of the printer and files. Files of any length may be sent or received.

DOS commands, FREE, DIR, etc., can be issued anytime. The only limitation is that commands must execute in the lower 16K of memory in order to maintain positions in the transmit and receive files.

There are six other programs included with Modem 80. HOST1 allows remote operation of your TRS-80 by another terminal or computer. An auto-answer modem is a must for this feature. XMODEM allows file transfer under HOST1 even for 16K computers. SAVE is used to prepare files off-line for transfer. If a word processor is available, this program won't be used as it has very limited editing. TYPE displays files to the screen or printer much like the LIST command in TRSDOS.

For computers using only seven-bit characters, files must be in ASCII form. HEX allows machine language or any other file to be changed to ASCII. Files could be downloaded from a seven-bit system and then changed back to eight-bit by using HEX. CP/M type files create problems for TRS-80 systems since they use available codes. TEXTFIX takes care of these differences and also eliminates control characters.

Modem 80 is a tremendous value. I find it hard to believe this product is marketed for under $40. It includes most of the features any user would desire in an intelligent terminal program and functions exactly as advertised.

Mark E. Renne

TRS-80 Model III Programming and Applications Larry Joel Goldstein Prentice-Hall $12.95

I love to read about programming and new applications for computers. Since a great deal of my time is spent working on them, I look on it as necessary for professional survival.

When 'TRS-80 Model III . . .' came out, I was looking for more detail about the Model III. What I found was different than my expectations, but very useful.

Goldstein has taken a very simple, hand-holding approach to the Model III. He has chosen to assume little or no knowledge and he leads the reader carefully through the steps of using and programming his Model III.

Chapter 1 (A First Look at Computers) spends several pages explaining terms like CPU, RAM and ROM. He highlights with comments like: "Important: If the computer is turned off, RAM is erased."

In the next section, he leads the new user by the hand and introduces him to his Model III. For example, he says: "Look under the keyboard. On the right side you will find the Power-On. Push it."

Chapter 2 (Getting Started in BASIC) moves into an introduction to BASIC. It follows in the same hand-holding fashion.

Other chapters are: More About BASIC, Easing the Frustrations of Programming, Your Computer As a File Cabinet, An Introduction to Computer Graphics, Word Processing, and much more.

He includes lots of programs, exercises (with answers in the back of the book), and quite a bit of good advice.

Many people will not like this as much as David Lien's hand-holding books. Goldstein has a different style. But this is a solid, factual book.

Terry R. Dettmann

EDTASM+ Color Computer 16K minimum Radio Shack $39.95

Radio Shack recently released the long-awaited editor-assembler for their Color Computer. Having spent lots of money at my local computer center, my pusher naturally pointed out the new program to me after I had gotten about three steps into the store. I bought it and took it home to have a look-see. Here is what I found.

The program is packaged as EDTASM+ and is furnished in a ROM pack. The minimum system for the program is a 16K RAM Color Computer with a tape recorder.

Actually the ROM pack is four programs in one. First, it is a text editor which may be used to create assembly language source code, BASIC programs, or even for editing pure ASCII text. Second, it is an assembler. The assembler provides you with the means to assemble code

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in memory and with the use of ZBUG, to test your code without leaving the program. Third, there is ZBUG, a monitor program that can be used to examine and change the contents of the CPU registers and the contents of memory locations. The last function of the package is as a disassembler. This is not advertised, but the ability is there nonetheless.

On power up, the program is in the editor mode and you are prompted with an asterisk (*). While in the editor you have many functions available for writing, changing and manipulating text. Also, the editor adds the long-awaited AUTO command to the abilities of the Color Computer. By typing I <ENTER> the editor will automatically give you line numbers starting at 100 and incrementing by ten each time you hit the enter key. By using the command I s,i (where s is a starting line number and i is an increment value) you may choose to have your own line number sequence. Also, the V command will allow you to verify that a tapefile, written with the W command, does indeed have the same data on tape as was originally in memory. Model I and III users will recognize this as the equivalent of the CLOAD? command.

The editor gives you much more editing power than does BASIC's editor. The line-editing functions are much the same as they are in Extended Color BASIC. However, you now have shorthand commands for things like edit and delete. Use just E or D instead of the entire word. You also have a copy command which can copy whole groups of program lines from one location to another, while the move command can move lines from one location to another. There is even a find command which can be used to locate any string in your text.

When you are done with your text, you can save it on tape with the W command. If you wrote a BASIC program with the editor, you can now go directly to BASIC with the Q command. If you find that your program has bugs in it you can re-enter the editor by using the command "EXEC 49152" or "EXEC &HC000." If you wrote a BASIC program, you must save it to tape and load it from tape while going to and from BASIC. The buffer area and BASIC's execution area are different.

If your text was an assembly language source code you may issue the A command to assemble your code and then use ZBUG to debug it. Numerous "switches" are available with the assemble command. NO (No Object code) is used for testing your source code for typos, addressing and other errors. The WE (Wait on Error) switch will cause the assembly to halt when an error is encountered so that you may correct it. The LP switch may be used to direct the listing to the line printer. The NL switch can be used when you want to see No Listing at all. The NS, No Symbol table switch, is handy when you want to catch the

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total number of errors in your program.

There are three more switches which may also be used to control the location of your final object code. The AO switch forces the assembler to start the code at the address specified by any ORG statements in your source code. AO stands for absolute origin. The In Memory (IM) switch causes the code to be assembled in memory. You can then use ZBUG to test it before you finally save the source and object code to tape. There is also a switch called MO for Manual Origin, but as the manual says, "this procedure is somewhat involved," so we won't go any further with it here.

Now you can test your code without writing it to tape and running it with a separate monitor. By using the IM assembly switch and ZBUG you can thoroughly test your program without leaving the keyboard. I would suggest saving the source code to tape before actually testing the object code; just in case your computer decides that the entire contents of RAM would be a great thing to have for lunch. At least then you won't have to start over from square one.

ZBUG allows you to work in octal, decimal or hexadecimal number bases. You can even input data in one base and have it displayed in another. You can do math and complex logical operations from within ZBUG and also test relational operators. You can set up to eight breakpoints within your program and even specify how many times the breakpoint should be passed before actually halting the program. All the usual debug commands are available, such as examining or changing registers and examining memory in four different output formats. You can load machine-code files from tape and write executable object-code tapes from memory. There is even a command to move the contents of memory from one location to another. It does not change addresses, but makes a mirror image of the source locations.

The manual is sixty-seven pages long. Although the data is sparse, it is complete enough. They have not created an overly thick book with command listings as they did with their EDTASM packages for the Model I and III. There is a list of the 6809 instruction set, an appendix with page references for each of the program functions, and even a list of editor error messages with a thorough explanation of what will cause a given error. Appendix E even gives you a more detailed memory map than in either of the Color BASIC manuals. This manual from Radio Shack even has an index that is usable!

Don't depend on this manual to teach you 6809 assembly language. It is not written for that purpose.

Having used several editors, assemblers, monitors and debuggers on my Model I, I would say that for the average assembly language programmer who works only with tape, this is a more than adequate package. For those who program primarily in BASIC, I would recommend the program for its excellent editor and the extra functions it provides in a tape-based system.

J. L. Latham

PRINTCC version 1.4
Color Computer and
16K Model I/III
J. Gary Bender
P.O. Box 773
Los Alamos, NM 87544
(505) 662-7835
$15.00

CompuServe and The Source are marvelous information systems. They put many people into contact with each other that might otherwise never meet. Just such an occurrence happened to me recently. Through the Color Computer Special Interest Group (CCSIG), I "met" a gentleman by the name of Gary Bender who noticed that I was a software reviewer and he offered to provide me with a program he had written with the hope that I would

OMNITERM

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Why do I need it?

You need **OMNITERM** if you need to communicate efficiently with many different computers, or if you want to customize your TRS-80 for use with one particular computer. You need **OMNITERM** to **SOLVE** your communications problems once and for all.

What do I get?

The **OMNITERM** package includes the **OMNITERM** terminal program, four conversion utilities, a text editor, and setting files for use with popular computers such as CompuServe, the Source, and Dow Jones — just as samples of what you can do for the computer **you** want to work with. The package includes six programs, seven data files, and real documentation: a 76-page manual that has been called **"the best in the Industry."** And **OMNITERM** comes with real user support. We can be reached via CompuServe, Source, phone, or mail to promptly answer your questions about using OMNITERM.

What do I need to use OMNITERM?

A Model I or Model III TRS-80, at least 32K of memory, one disk, and the RS-232 interface, or Microconnection modem. **OMNITERM** works with all RDMs and DOSes, and **will** work with your special keyboard drivers.

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"**OMNITERM** has my vote as the top TRS-80 terminal program available today" Kilobaud Microcomputing, June 1981, pages 16-19.

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Available this fall, **OMNITERM** for the TRS80 **Model II** and **IBM personal computer.** Contact Lindbergh Systems for details.

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review it for him. I accepted his offer of free software. About a week later it arrived at my door.

Gary has written a program for the TRS-80 Model I and Model III computers that allows them to work with the Color Computer. He calls this program PRINTCC and it is designed to let your Model I or Model III act as a printer buffer to your existing parallel printer. With a 48K TRS-80 you can have a buffer of up to 32K characters! That means you can dump all of any standard sized Color Computer's memory to the printer. No waiting, no purchasing a serial printer, and no purchasing a serial-to-parallel adaptor for your Color Computer.

I found PRINTCC to be a well written, bug free program. Its basic purpose is to act as a buffer for printed data-like letters. It can support the Semi-graphics 4-mode (SET/RESET graphics) and screen dumping, force output in all capital letters or 64-character print width. This machine language program allows you to select its features from a menu presented on the Model I/III and to change those selections from within a BASIC program that is running on the Color Computer. It operates from 300 to 4800 Baud. POKEs for the Color Computer to change the baud rates are provided in the documentation and on the screen of the Model I/III.

If you have both a Color Computer and either a Model I or Model III that is RS-232 equipped, and you already have a parallel printer attached to your Model I/III then this is definitely a program to have. Even if you have already purchased another printer to go with your Color Computer you might consider this program because of its buffered output capability. To buy a "black box" to provide you with up to 32K buffering will run you around $300. You can have this for under $40. How's that for a good deal?

You do have some hardware to think about with this program. You need a cable to connect the Color Computer to either the RS-232 connector on the Model I/III, or to the end of an RS-232 cable that is connected to the Model I/III. The current documentation gives instructions on how to construct a cable to connect to a RS-232 cable, and soon it will include instructions on how to construct a cable to connect directly to the RS-232 connector on the Model I/III. If you do not want to construct cables, you may order one for about $16.

Would I buy the program? I just wish I had known about it before I bought my serial-to-parallel converter. I have had no problems with the program since getting it from the author, and I haven't even had to ask him how to use a particular feature. The documentation is quite good, and it will soon be even better. I have run the program at up to 4.5 MHz on my Model I and it works reliably at all speeds and baud rates. Mr. Bender has created a winner.

J. L. Latham

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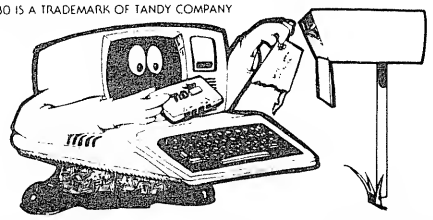

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Three by
Fantastic Software
Model I/III 48k disk
Fantastic Software
P.O. Box 27735
Las Vegas, NV 89126
(702) 362-1457
$39.95

Not too long ago, a company called Fantastic Software released three new games which in themselves were fantastic. These games were called Forbidden Planet, Forbidden City and Hyperlight Patrol. Each one costs $39.95.

Talking Adventures

The first two programs, Forbidden Planet and Forbidden City, are written by William Demas and are both talking adventures. Each are played like the regular type of adventures, but they also possess voices to enhance the game greatly.

Forbidden Planet adventure begins with a friendly "welcome to adventure" voice. I am then asked if I would like to load in a saved game. If I were playing a game and wanted to continue later, saving the game would allow me to do this, rather than starting at the beginning of the adventure the next time I played.

Whether I want the voice or not is then asked. I enjoy listening to the voice, so I answer yes, but it is a nice option. Finally, the adventure begins.

The fact that this game, along with Forbidden City, is a talking adventure does not mean that every single word is pronounced. Producing a voice through a cassette port takes a *great* deal of memory, so not every word can be programmed into the game. However, a sufficient number of spoken words are scattered throughout the game to make it interesting.

Forbidden Planet is played just like any other adventure. By using simple commands, I am able to travel, maneuver things, or do whatever I would like. The 140-word vocabulary is sufficient, though figuring out what words to use at certain times makes the game extra challenging.

To be honest, I have never been much of an adventure fan. I don't hesitate to say that I am completely "in love" with playing this adventure. The voices may have caused my change of mind, but the fast action and challenging scenarios make it something truly special.

I feel very much the same way about Forbidden Planet. Both of these adventures are exciting, challenging, and very impressive, even just to observe. Both of these machine language programs were obviously well thought out by the author, William Demas, and it really shows.

The voices in both games are the best I have ever heard. In fact, the voices in this game rival many hardware voice synthesizers I have listened to, and Fantastic Software's secret of making the voices so well is a well-guarded one.

The package which comes when either game is purchased is unique. It is a small leather booklet, which has a picture on the front depicting a scene from the game. Inside the booklet is the diskette, brief instructions and a hint sheet. I found the hint sheet especially helpful, since there were times in the game when I really needed it.

There are no bad points to either of these games. Whether or not your are an adventurer, I know that you will find these games entertaining, challenging and impressive.

The voices add a lot of sparkle to the game, the package is well designed, and the adventures themselves are superbly done. I highly recommend both of these games.

Hyperlight Patrol

Hyperlight Patrol, the third game from Fantastic Software, is packaged just like the other two, but it contains more documentation. Ten pages of instructions are reasonably easy to understand, and documentation is also provided within the program.

This game reminds me a little bit of Starfighter from Adventure International. This game features voices for the people who have a TRS-80 voice synthesizer. Unfortunately, a Model III is not compatible with a TRS-80 voice synthesizer, so I had no chance to listen to the voices. Perhaps it would have been better to do the voices as

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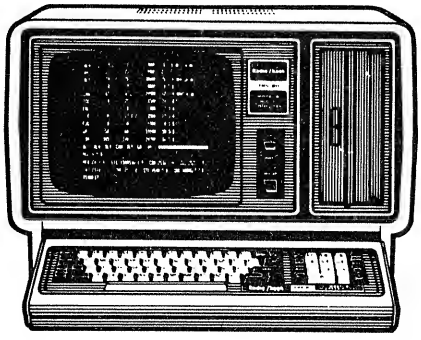

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they were done in the two talking adventures, that way everyone would be able to listen.

When the game begins, it takes about thirty seconds to set up a scenario. The object is for the player to use a tactical display and numerous commands to destroy enemies in the areas assigned to him. Patrol area, speed, energy reserve, alert condition and several other status indicators are displayed at the top of the screen.

The commands are so numerous that I always keep a summary sheet by my side to help me. There are commands for weaponry maneuvering, computer access, shield positioning, hyperlight speed, and several other navigation commands. It takes the computer a little while to respond to these, so it is not exactly a *real time* game (though it is very close).

Each time my ship comes within range of another ship, a status report of the other ship is given. I may attack, examine, go to another place in space, or do almost anything I desire. The game is fairly realistic and exciting, but not so much as Starfighter. For people who enjoy Star Trek type games, or games which involve more than just quick reactions, this is one for your software library.

I am pleased with these three products, especially the adventures. Every one is well-packaged, well-supported, and professionally made. If you are not an adventure fan, perhaps you will find that Forbidden Planet and Forbidden City can snap you out of that. I enjoyed all of these games, and suggest that you look into at least one for a very pleasant surprise.

Tim Knight

Vaults of Cymarron
Model I cassette or disk,
Model III cassette,
Compu-Things
270 Broadway
Revere, MA 02151
(617) 289-8866
$39.95

Having relaxed for what seemed like a nano-second in a luxury hotel in Babylonia, I called the front desk to query about my bill and found that it had jumped macrounits. Unfortunately, I could not afford the increase, so I contacted the friendly credit loan office.

This "organization" seemed like a nice "family" operation. They listened to my problem attentively and offered me a solution. The solution was one that I could not refuse and seemed easy enough for an expert adventurer like myself. After all, hadn't I completed the impossible mission, traveled to Savage Island, found the lost Dutchman's gold, and almost deduced the location of the Alkemstone? I dealt with the graphic pawnkeeper and fared pretty well, but as I disembarked Babylonia for Cymarron, I had a strange feeling that I was in for the adventure of my life.

Cymarron's climate is hostile in the extreme, but the flight was pleasant enough. I listened to the top ten sounds, from "Hype Me" by Gene Techny, to "Phylogenic Replay" by Ontogenis Russel, and "White Christmas" by Bing Crosby. As monsters attacked me from every direction, I fought bravely, using my stellar sword and other paraphernalia purchased from the pawnkeeper. I searched my way through various rooms and found a computer terminal (I couldn't get it to work — couldn't have been a TRS-80).

Having played adventures where I was placed upon deserted islands, carnivals and lost space ships, it was a pleasure to be on a planet where pleasures were the core of life and perversions an overtone. The game was not a raunchy adventure loaded with vulgarity (except those uttered by this player), but offered a setting enjoyable to most with the ability to enjoy life, adventures and an occasional "Captain 80" article.

When I purchased "Vaults of Cymarron" from Compu-Things, I thought the price ($39.95) was a bit high. After playing and replaying, I felt that it was money well spent. The graphics are well done and the verbiage is excellent. The clues are varied in degrees of difficulty.

I called Compu-Things to find out more about the adventure and found that it was written by an English programmer. They did not know if there would be a sequel by the same author, but promised they would let me know as soon as he was released from the happy farm. If there is a sequel, this adventure addict will be in line to purchase a copy. I would rate "Vaults of Cymarron" nine for graphics, nine for adventure, and a bountiful ten for fun.

Dustin Andrew

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Microcomputer Primer
Howard W. Sams & Co.
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$12.95

This second edition of the 1976 work is completely revised and updated to cover recent changes in microcomputer technology. The text takes the reader by the hand and introduces him to the vast world of microcomputers.

Beginning with an overview and introductory concepts, the reader is shown a comparison of CPUs, breadboarding, prototyping, memory addressing, RAMs, ROMs and PROMs. Interfacing, programming and operating systems are the topics that complete this comprehensive text.

For the user of the 16-bit micros, the 8086, Z8000 and 68000 MPUs are compared. For those who still prefer the simple byte, the 2650, 1802 and Z80 8-bit micros are discussed in detail. If you can't choose between the two, then look forward to reading about the "enhanced" 8-bit microprocessors that work internally like 16-bit machines; the 6809 and 8089 micros.

Schematics, diagrams, superb drawings and photographs help to make the coverage quite thorough. Do not expect an easy time of it. The material is for a beginner, but only one who wants to devote the effort to really learn. An electronics background is a plus in helping to get over much of the material. Appendices on number systems, memory devices, chip selection, pinouts and other tables are included.

Take a look at this book. It is worth the price and the effort.

Cameron Brown

Alien Defense
Model I/III
Soft Sector Marketing
6250 Middlebelt Rd.
Garden City, MI 48135
$15.95 cassette
$19.95 disk

Attention, all you frustrated Model III owners who know that lurking in your ROM are characters which, to this point, are untouched by arcade game authors. You know the ones I mean, little space ships, greek letters, people and assorted symbols beyond the realm of mere mortals. At last, a program has emerged that uses those characters to create a high-speed, machine language arcade game.

Alien Defense is similar to the arcade game Defender and also features human voice prompts on the disk version. A Model I version is available that uses standard letters and symbols instead of the Model III special characters and the game functions the same on either system. One feature I particularly enjoy is that talking is an option. You may elect to turn it off at the initial power-up. Although the new wave of "talking" sound effects are nice at times, they become annoying if used constantly. Alien Defense gives you this choice.

You begin with three ships and three smart bombs with an additional ship and bomb added at each 10000 points. Your goal is to keep the landers from picking up your men (fifteen are located randomly at the bottom of the screen) and taking them to the top and turning them into mutants. Smart bombs when activated will destroy everything on the screen *including* men located at the bottom. All in all, there are six different types of aliens attacking you and your men and they attack with various degrees of success and score assorted points for destruction. A bonus is given for men remaining after twenty-five aliens have been killed.

Movement of your ship is controlled with the 1, 2, 3, 8 and 9 keys. The space bar is used for smart bombs and ENTER is used for hyperspace. But, the voice yells "chicken" if you use hyperspace. High scores are recorded on the disk version and sound effects are used throughout, even when you are not using voice option.

This game is fast and the aliens are not easy to defeat, especially the cruisers which follow your ship without relief. The only thing missing from the game is a scanner that indicates where the aliens are and if they are picking up men. Arcade fans will find the game to be as challenging as the coin version and Model III owners now have something which shows off its special features.

Mark E. Renee

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Pascal-80 Phelps Gates

This friendly, easy to use version of Stondord *Pascol*, aa reviewed in the December 1981 **Byte**, is now even better! New version works on TRS-80 Model I and Model III, under TRS-DOS, NewDOS, NewDOS 80, DOSPlus, LDOS, and DoubleDOS. An author package allows you to create your own /CMD files without any royalty paymental Upper and lower caae is fully supported. You can protect memory and call machins language programs. New extensions include SET, RESET, POINT, RND, and the UCSD Include procedure. Utilities are provided to convert to and from ASCII files. Pascal 80 now comes in a binder with an 80 page manual by George Blank.

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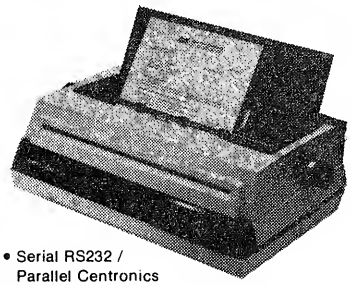

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New products

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Pioneer Software announces their new music Editor, Player, Composer and Compiler for the Model I or III.

MUSIC MAGIC allows you to type in sheet music and then play it back either from within MUSIC MAGIC or dump it to disk as a BASIC subroutine for use with other programs. It creates music in one voice with three octaves and sharps and flats. You can play back music at nine different speeds and repeat sections with ease. MUSIC MAGIC graphically portrays the notes for you as it plays. Great for teaching. Comes on disk for either Model I or III, requires 48K. Special introductory price of $30. For orders or information contact, Pioneer Software, 1746 NW 55th Ave. #204, Lauderhill, FL 33313.

#200

Powerful Statistical Package

A — Priori Software announces the release of its latest statistical program XTABS for the TRS-80 Model I or III. It gives more information than any other program available, more than even the mainframe package SPSS. XTABS can display on the screen, or format for professional looking hardcopy. Write results to a disk file to be merged with word processors. Select parts of the output to be printed, displayed or sent to a disk file. Statistics provided include: chi-square, percentile rank of chi-square, G statistic, Phi, Cramer's V, Contingency coefficient, and symmetric and asymmetric Lambda, Uncertainty Coefficient, and Somer's D. Statistics for each cell are also displayed including frequency, percent of total, row and column, and contribution to chi-square. It costs only $49.95 alone, or $24.95 with the purchase of SPM, the best statistical package released for the microcomputer. Specify model, memory size and disk format. Contact: A — Priori Software, 1005 West Main, Vermillion, SD 57069, (605) 624-4214.

#201

Mainframe Replaces Expansion Interface

The Holmes Expansion Mainframe upgrades the TRS-80 Model I with gold connectors, buffers for high speed operation, room for four peripherals for upgrading, power supply and sturdy metal enclosure for durability and shielding properties.

The Mainframe can be purchased with a double density disk controller allowing use of double density and 8" drives for only $319. Included in this system is a "state-of-the-art" LSI data separator, parallel printer port and cable connecting keyboard to mainframe.

Other peripherals available or under development at Holmes which plug into the mainframe include 80-Character Video, Extended Memory and RS-232.

Other products which enhance the mainframe and fit inside the keyboard include the Holmes Sprinter II (which allows the mainframe to run at higher speeds and operate 8" Double Density drives), and Holmes 48K Internal Memory, which functions with Holmes Extended Memory in the mainframe to allow "transparent" memory expansion above 48K.

For more information call or write: Holmes Engineering, Inc., Dept. #20, 3555 South 3200 West, Salt Lake City, UT 84119, (801) 967-2324.

#202

Color Computer Enhancement

Platinum Software has introduced the Platinum Worksaver, a programming aid that can reduce programming time by fifty percent. The Worksaver, which is designed for the 16K Extended Color Computer, occupies less than 2K of memory. It provides full screen editing of BASIC programs with automatic line numbering, changes, deletes and inserts, using a completely movable cursor. Full screen editing of numeric and string arrays is supported — the beginner doesn't have to fuss with previous errors, and the advanced user can use this feature to create his own VisiCalc or word processor. Single-key entries of over ninety BASIC words, program chaining and dynamic debugging are featured. Load new programs without disturbing existing data. The Platinum Worksaver also converts the right side of the keyboard into a numeric keypad, allowing fast entry of numbers.

The package contains the enhancement program, including a sample mini word processor on cassette, detailed instruction manual, and a fully labeled plastic keyboard overlay which shows the single-key BASIC commands, and the layout of the numeric keypad. The Platinum Worksaver costs $30 plus $3 S & H and may be ordered

from Platinum Software, P.O. Box 833, Plattsburgh, NY 12901, (518) 643-6796.

#203

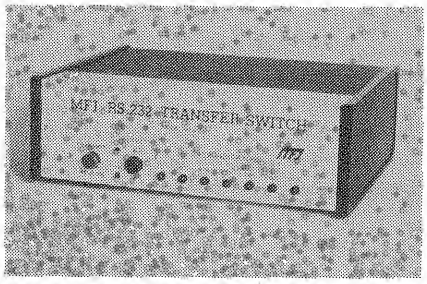
First Language for Radio Shack Model 16

Softworks Limited is offering a complete C Compiler for the Radio Shack TRS-80 Model 16. The Model 16 is Radio Shack's new computer based on the Motorola 68000 microprocessor chip.

Softworks' implementation of C is based upon Whitesmith's C compiler, a complete implementation of the C language. Cross-compilers are available for developing Model 16 C programs using different machines.

The C language is immediately available and is priced at $950, documentation package is $30. For further information contact: Mr. Bob Salita, President, Softworks Limited, 607 Wellington, Chicago, IL 60657, (312) 327-7666.

#204



New MFJ-1240 RS-232 Transfer Switch with LED Data Indicators

MFJ's new computer transfer switch lets you switch from one RS-232 peripheral to another without downtime, frustration and expense.

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MFJ-1240 RS-232 Transfer Switch is available from MFJ Enterprises, Inc. for $79.95 plus $4 for shipping and handling. To order, call toll-free 800-647-1800 and charge it to your VISA or Master Charge account or mail your order to MFJ Enterprises, Inc., P.O. Box 494, Mississippi State, MS 39762.

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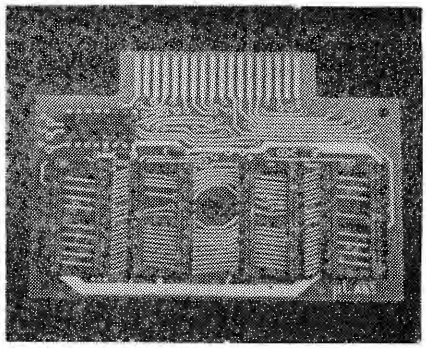


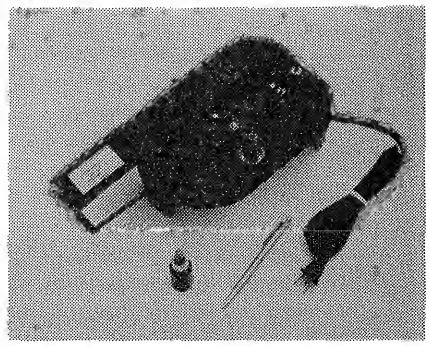
Color Computer EPROM Cartridge

The CMEMORY-16 is a plug-in cartridge for the TRS-80 Color Computer which allows the user to add up to 16K of continuous read only memory. From one to four 2732 EPROMs can be plugged into the available sockets enabling the user to save his favorite utilities or games in easy to use cartridges. For dedicated applications a permanent, fool-proof program in EPROM is the only viable solution.

By adding a jumper, the Color Computer can be set to automatically execute a program in EPROM whenever reset is pressed or the computer is turned on. The cartridge plugs into your Program Pak expansion slot.

CMEMORY-16 cartridge without any memory sells for $34.95. 4K 2732 EPROMs are available for $24. An 8K version which uses 2K RAMs or 2716 EPROMs is available for $24.95. For further information contact: Micro-Labs, Inc., 902 Pinecrest Drive, Richardson, TX 75080, (214) 235-0915.

#206



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THE WEATHER ANALYST

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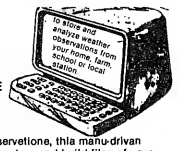

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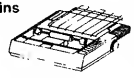

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E. J. Neiburger, D.D.S., Editor
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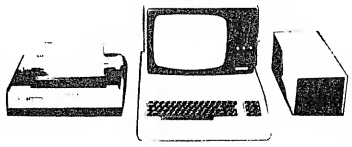

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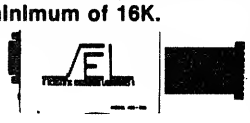

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These notices are free of charge and will be printed one time only on a space available basis. Notices will be accepted from individuals or bona fide computer user clubs only. All announcements must be typed, contain 75 words or less and include complete name and address.

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Mar 83	Jan 3	Dec 10
Apr 83	Feb 1	Jan 14
May 83	Mar 1	Feb 14
Jun 83	Apr 1	Mar 14

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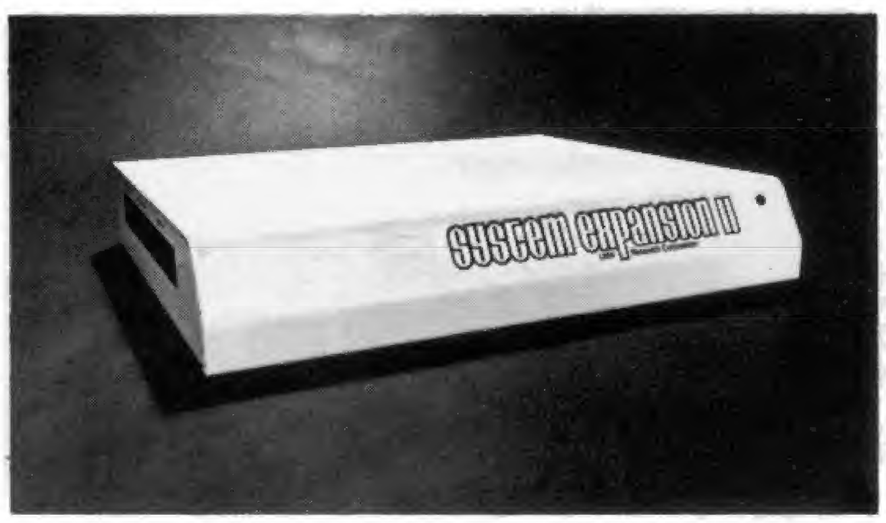

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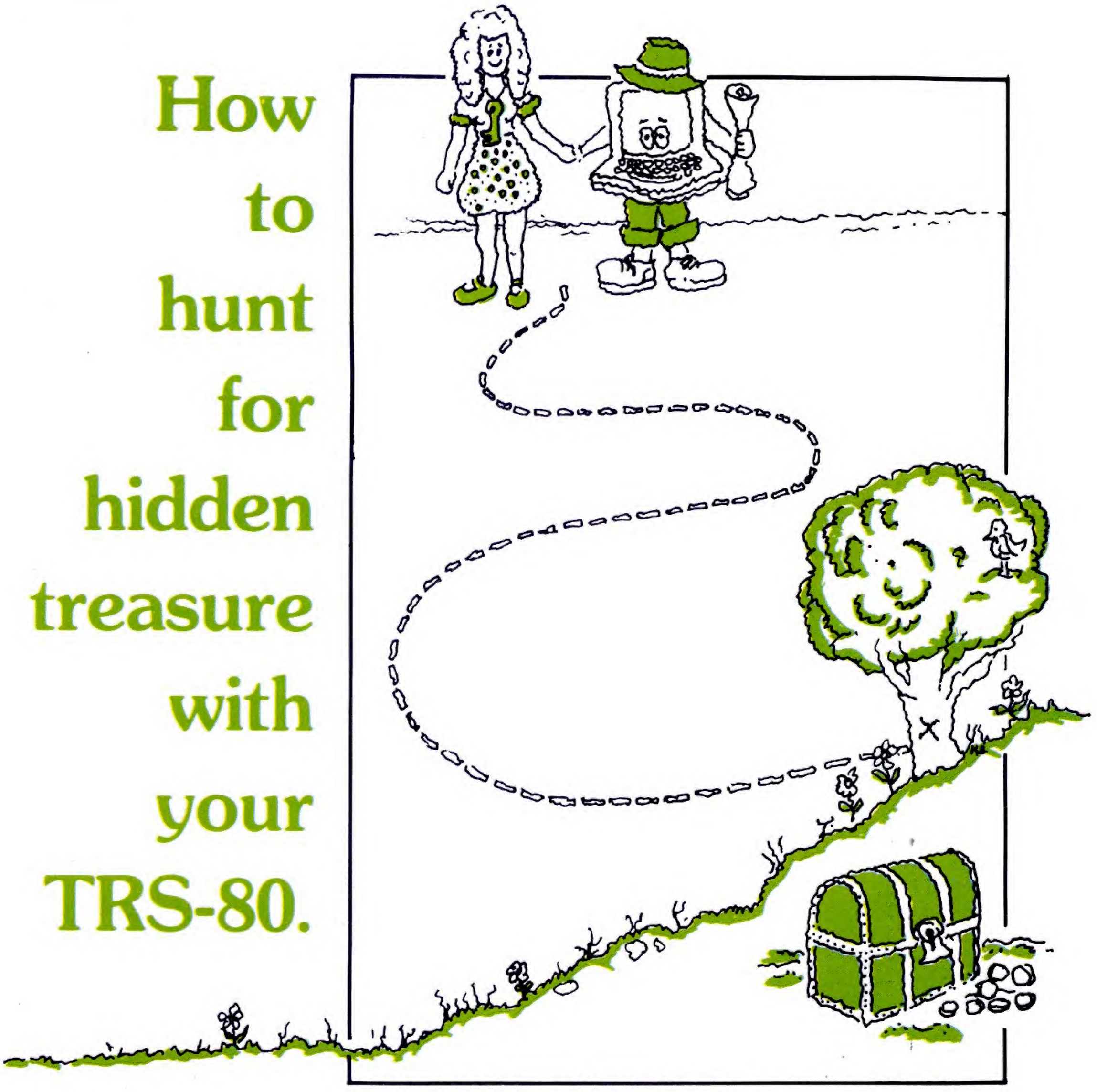

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